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ENCYCLOPÆDIA BRITANNICA.

NAVIGATION, INLAND.

Navigation,
Inland.

General
observa-
tions.

INLAND WATERS, suitable for navigation, form a medium of conveyance, upon which can be transported, at a very small expense, and with a smooth or easy motion, all sorts of articles; but it is especially adapted for those which are very heavy, very bulky, or which could not well bear any rough carriage. In these respects, inland navigation has greatly the advantage of common roads, and is often preferable even to railways; and, besides, in many cases where a ship cannot be brought close up to a railway, goods can be loaded immediately from, or disloaded into, a canal-boat coming alongside of the ship, thus avoiding a second loading and disloading. Frequently, too, canals combine the advantage of aqueducts and of drainage with navigation; but they can never compete with railways where great speed of travelling is required, or where water is scarce, or in the time of frost; for the value of inland navigation in any particular country, or the fitness of that country for it, must depend very much on the supply of water, and the duration of the season which is exempt from frost. In the following brief treatise, we shall confine ourselves chiefly to artificial navigation,¹ and touch very slightly upon rivers and lakes; because descriptions of the most of these will be found in other parts of the work, either under their own names or those of the countries to which they belong; and the same thing may be said of various canals.

Origin of
canals.

It is not known when, by whom, or in what country, artificial water communications were first constructed; though it is extremely probable that canals which had originally been made as aqueducts for drainage and for irrigation, came at length to be applied to the purposes of navigation. It is well known that works of this kind, connected with the Nile, the only river of Egypt, had existed in that country at a period so remote, that history has left us nearly as ignorant of the precise era of their origin, as it has of that

of the pyramids. Nay, history does not so much as inform us with certainty when, or by whom, the great canal was first constructed, which anciently connected the Nile with the Red Sea. The early inhabitants of Babylonia or Chaldaea guarded against the detrimental inundations of the Tigris and Euphrates, by numerous artificial rivers and canals, which served to distribute the waters for the benefit of the country in general; and these at length were applied to form an easy navigation between its different parts. At a very remote period of antiquity, too, canals and pits were dug in Bœotia for drawing off the water of the Lake Copais, in order to prevent its overflowing the whole country; and these came to be afterwards used for navigation. The "*fossiones Philistinæ*," which were large canals, first made to drain the marshes bordering on the Po, are ascribed to the Canaanites, and especially to the Capthorim, who at a remote period are supposed to have emigrated from the country of the Philistines.

Navigation,
Inland.

EGYPT.

It is not our intention to enter into a particular description of even the existing canals of Egypt; but, on account of the recent attempts to abridge the route to India by passing through Egypt, we shall briefly advert to the ancient history of its great canal, and to the proposals for restoring it, or constructing another across the isthmus of Suez, especially as the other route to India by the Euphrates has been abandoned. Some learned moderns, perplexed by the vague and contradictory statements of the ancients respecting a canal between the Nile and the Red Sea, have questioned its having ever existed, except partially as an aqueduct for irrigation. The survey made by order of Bonaparte in 1799 has, however, not only tended to remove these doubts, but also to ascertain the line which it

Great canal
anciently
constructed
across
the Delta.

¹ In hereafter specifying the dimensions of a canal, we shall always have in view those which were given it artificially; for whenever the sides of a canal consist of ordinary earth, the marginal or protuberant corners gradually crumble away, taking a rounded form, whilst the hollow corners at the bottom are as gradually filled up, thus leaving the contour of the section of the canal for the most part curvilinear, and the water, of course, deepest in the middle.

Navigation,
Inland.

followed. Of ninety miles of inland water communication of which it consisted, it appears that sixty-five were cut by human labour; and, of this portion, about one half yet exists in many parts so entire that its dimensions can be measured with tolerable accuracy, and little more than cleaning would be required to render it again fit for navigation. According to the French engineers, this canal extended upon one level from Bubastis to Arsinöe; or rather, it must have had a very slight declivity, so as to carry the waters of the Nile to the Red Sea.

The direct distance from the nearest point of the Mediterranean, which is a little south-east of Tyneh, to the northern extremity of the Arabian Gulf, which is a little to the north-east of Suez, is about seventy-five miles; and it is almost precisely the same from the latter to the site of the ancient Bubastis, on the now deserted Pelusiatic branch of the Nile. The length of a canal from sea to sea, following what the French engineers considered as the most suitable ground, would be ninety-three miles, and that of the ancient canal from the Red Sea to the Nile was about ninety-two.

Since, according to the levels taken by the French, the inundation of the Nile, when not restrained by artificial barriers, must have reached to within two or three miles of the Red Sea, it has been supposed that the practicability of forming a canal must have suggested itself at an early period. The sandy isthmus north of Suez, which is but a yard above high-water level at present, has, no doubt, during the lapse of 3000 years, been raised a little by deposits of soil and sand. It is therefore supposed, that in those remote ages when the canal was first thought of, a shallow trench or furrow two or three miles long would have united the waters of the Nile and the Red Sea, affording the ancients a pretty correct idea of the relative levels of the Delta and the Gulf.¹ Aristotle, Pliny, and Strabo, ascribe the plan of forming the canal to Sesostris. The two former say it was abandoned because the waters of the Red Sea were higher than the Delta. Strabo treats this opinion as unfounded. Herodotus, in his book *Euterpe*, says the project was begun about 616 before Christ, by Necos, the son of Psammeticus, but who desisted at the command of the oracle, after having lost 120,000 men, and that it was completed by Darius Hystaspes; that the canal was supplied with water from the Nile, which it joined a little above Bubastis; and that it terminated in the Arabian Gulf near the city Patumos. Diodorus says it was begun by Necos, and continued by Darius, who afterwards abandoned it from the fear of Egypt being inundated by the Red Sea, but that it was completed by Ptolemy Philadelphus; that it extended from the Gulf to the Bay of Pelusium; and that it had sluices or gates, which were opened to allow ships to pass and quickly shut again (lib. i. sect. 1). According to Strabo, certain lakes above Pelusium in the desert were connected with the Red Sea by one canal, and with the Delta by another; and these lakes, which had originally been bitter, became sweetened by the introduction of the water of the Nile. This canal was completed by Ptolemy, who constructed a gate which afforded an easy passage between the sea and the canal, and which some fancy to have been what we now call a lock (lib. xvii.). According to Pliny, the canal reached only from the Nile to the Bitter Lakes, and was about thirty-four miles long. These statements may be reconciled by supposing, that though from the Delta to the Gulf the canal had been repeatedly opened, the communication with the Red Sea being dif-

ficult, and only available for ships during a very limited part of the year, this southern portion of the canal had been often closed and abandoned. The other portion being serviceable for a longer season, might be kept more generally open. About the year 644, the canal was re-established and greatly improved by the Caliph Omar, who carried the western end south to Cairo, by a branch called the "Canal of the Prince of the Faithful," but afterwards the "Canal of Cairo." The water being thus taken from a point of the Nile six feet higher than the former one, the navigation could, of course, be kept open during a much longer part of the year. In this way the Nile and Red Sea were connected for more than 120 years; but since then the communication has been shut during more than 1000 years.

The line or track of the ancient canal, in its more improved state, is generally represented on maps as having a pretty close resemblance to a semicircle, both extremities being nearly in the thirtieth parallel of latitude, and the middle about half a degree more to the north. Such a line almost coincides with that surveyed by the French engineers between Suez and Cairo, and which they have described in their great work on Egypt. But, from the flatness of the country, they thought it would likewise be quite practicable to construct a ship canal, which would join the two seas, independently altogether of the Nile, by leading off a branch from near the middle of the line which we have just mentioned, to meet the Mediterranean at Tyneh, a place nearly in the meridian of Suez. This second canal being only of the same length as the other, and free from the tedious navigation of the Nile, would be a much shorter route; and, if fed and kept clear by a constant current from the Red Sea, it would be navigable at all seasons, and quite independent of the extremely variable depth of water in the Nile. According to the French engineers, the current having a fall of twenty-six feet, would have energy enough not only to clear the canal of drift sand, &c. but also to hollow out and maintain a channel in the shallow and muddy bottom of the bay at Tyneh, so as to afford a sufficient depth of water into the port. Some English engineers, again, who have more recently visited Egypt, think a preferable and still shorter canal might be constructed from Suez to the great lake Menzaleh, which communicates with the Mediterranean to the west of Tyneh. But there is every reason to believe that the proposed railway across the isthmus would be greatly preferable to any canal which would not admit ships.

There would be no tunnels, nor rock cuttings, nor stupendous aqueduct bridges required in forming a ship canal across the isthmus. The only difficulty would probably be to obtain a sufficient depth of water at the ports in the two seas. Were this attained, we might assert with Mr Maclaren, "that there is not a spot in the world where a water communication of equal extent could be made with the same facility, and where human skill could produce so great a change with so small an effort." The navigation would suffer no interruption from frost in that climate; though there is reason to think that the difference of level in the two seas must vary somewhat with the direction and force of the wind, increasing with a south wind, and diminishing with a north; but this is not likely to be to such an extent as to prove at all detrimental to the scheme.

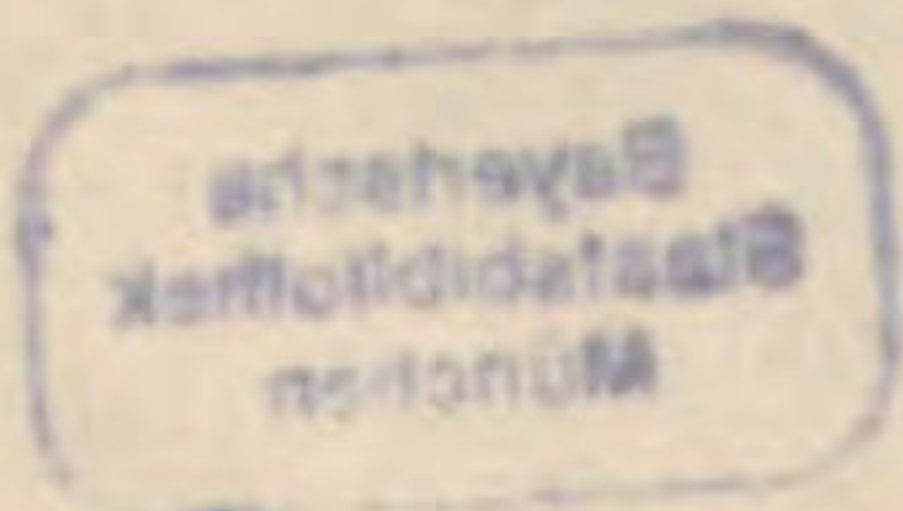
The Nile, which is remarkable for having no tributaries for 1300 miles up from its mouth, continues navigable for large vessels 600 miles above Cairo, up to the cataracts,

Navigation,
Inland.

Track of
the canal
from the
Nile to the
Red Sea.

Present
navigation
of Egypt.

¹ Such is nearly Mr Maclaren's view of the matter (Edin. Phil. Jour. vol. xiii. p. 274); but, since the levels of several coasts, relatively to those of the contiguous seas, are known to have varied sensibly in the course of a few centuries, it is evident that, independently either of depositions or corruptions, the relative levels of the Delta, Mediterranean, and Red Sea may now be very different from what they were 3000 years ago. Hence such a mode of judging how far the notions of the ancients on this point were correct, entirely fails.



Navigation,
Inland.

Navigation,
Inland.

Indus.

so long as it is sufficiently swollen by any remains of the inundation; but its waters become so low in May and June as only to be then navigable for small boats. A great part of the Delta is intersected in all directions with canals or aqueducts conveying water from the Nile for the use of the inhabitants, and for irrigating their fields; and some of these are likewise used for navigation. The present enterprising ruler of Egypt has turned his attention to the construction of canals; but, like his predecessors of old, he has been much blamed for being a very hard task-master, especially to the poor women and children, whom he compels to assist the men in digging canals, with no other tools than their fingers, and to continue at such work sometimes till numbers of them expire upon the spot. The "house of bondage" was nothing to this. The pasha has, however, been very unfortunate in the canal which he made in this manner, with the loss of 23,000 lives in ten months, from Alexandria to Fouah, a distance of about forty miles, as it has by no means come up to his expectations.¹ It is said that he is about to construct a very gigantic bridge of stone across the Nile, at the point where it is cleft into two principal branches, about five leagues below Cairo; and that this bridge is to be furnished with gates for regulating and retaining the waters for the necessary supply of the aqueducts and canals. Already he has made a bridge of this sort over the ancient Canal of Jussuf, which runs along the west side of the Nile, considerably above or to the south of the proposed new bridge.

CHINA.

Chinese
canals.

No country abounds more in canals and navigable rivers than China; but the greater part of that vast empire is so little known to foreigners, that the state of its inland navigation is in a great measure conjectural. The Chinese date the formation of some of their canals prior even to the Christian era; but, however that may be, they have, as far as is known, made almost no improvement on their mode of construction since Europeans became acquainted with them. Their canals, after all, are rather rivers flowing through considerably altered channels, than what are strictly artificial communications by still water. The Imperial or Grand Canal, forming a communication between Canton and the neighbourhood of Pekin, is, according to some, 2000 miles long, whilst others make it only 825. The whole line is no doubt of great length, but it is uncertain how much of it is mere river navigation. It is said to have occupied 30,000 men for forty-three years, and to have been completed in A. D. 980. Innumerable branches run from it in every direction. Since almost no part of it is level or still water, it has been inferred that the Chinese are ignorant of levelling; but this we should regard as a most groundless surmise, because the mere dealing so much with the management of waters as they have done for many ages could not fail to have taught these people, however stupid, something of the principles of levelling. It seems rather to have been the want of locks which naturally led them purposely to give that form to their canals; and it should not be forgotten that stagnant canals would be exceedingly unwholesome in a warm climate.

INDIA.

The inland navigation of the vast territory of India is of the most extensive sort, particularly that of the great rivers, the Indus, the Ganges, and the Brahmaputra, with their numerous branches, creeks, and canals. Taking the limit of the Ganges and Jumna to the west and south, and the

Brahmaputra and Megna to the east, the country intersected by navigable rivers, &c. may be computed as covering an area exceeding 180,000 square miles.

There is an uninterrupted navigation of 1000 miles up the Indus from the sea to Lahore, which is situated on the Ravee or Hydraotes, one of the most meandering of the five Punjab rivers or branches composing the Chenab. But, owing to the numerous shallows and sand-banks in some parts of the Indus, this extensive navigation can only be said to be open to the flat-bottomed boats of the country, which draw but four feet of water. There are, however, few rivers on which steam could be used with better effect than on the Indus, which is said to discharge four or five times as much water as the Ganges. It has no rocks nor rapids, and, unless when swollen, the current does not exceed two and a half miles an hour. The swell commences about the end of April, increases till July, and disappears altogether in September. Captain Burnes, who treats largely on this subject, supposes that the Indus is also navigable all the way up to Attock.²

There are many canals connected with the Indus, but they are principally for the purpose of irrigation, and the greater part of them are mostly natural creeks, having no water except during the swollen state of the river. Such canals intersect the delta, and are likewise pretty numerous between the latitudes of 26° 20' and 28°, particularly on the west side of the river; but the most ancient artificial canals connected with this river seem to belong to the Punjab district.

By means of the Ganges and its subsidiary streams, all sorts of articles can be conveyed between the sea and the north-west portions of Hindustan, over a distance of more than 1000 miles; and the time may not be distant when the navigations of the Indus and Ganges will be connected by a canal. The commercial capital Calcutta, upon the Hooghly branch of the Ganges, is therefore favourably situated for internal navigation. It is about 100 miles from the sea, and 130 from the Sandheads; but it has a very intricate and tedious navigation through the banks of sand and mud, which occasionally shift their beds in the Hooghly River, as well as in the other branches of the Ganges. The Nuddeah Rivers, which connect the Ganges with the Hooghly, are likewise, for eight months in the year, so extremely shallow, that the water communication between Calcutta and the upper country is during that time maintained by the Sunderbund passages, at a great expense of time and labour. To obviate this inconvenience, it has been proposed to construct a canal, which, branching off from the Ganges at Rajamahl, shall join the Hooghly at Mirzapore near Kulna; for, owing to the difference of level at the extremities, amounting to sixty feet, and the height of the Ganges itself varying thirty feet at different seasons, an open cut, without locks, would not suffice. The intended line, besides, being 300 miles shorter than the present route, would traverse a country rich in iron-ore and limestone, and would pass near extensive collieries.

Since the renewal of the East India Company's charter, the following works have been executed: Canal between the Ganges and Bugruttee Rivers; repair of an ancient aqueduct in the Deyra Doon, and restoration of the Delhi Canal; canal to unite the Hooghly with the Ganges, through the Salt-water Lake; canal to unite the Damrah and Churamunee; re-opening of Feroze Shah's Canal in Delhi completed; restoration of Zabita Khan's Canal in the Upper Dooab; the course of Ali Murdher's Canal drawn into Delhi; a new cut for the Votary Nullah; and canal at Chumnapore. A canal of seventy miles is now being exe-

¹ St John's Travels in the Valley of the Nile.

² Captain Burnes' Travels to Bokhara; and his Memoir on the Indus, in the Journal of the Royal Geographical Society.

Navigation,
Inland.

Backwater
navigation.

cutted, if not already finished, in the king of Oude's dominions, between the Ganges and its tributary the Goomty. There are several canals in Agra, but they are chiefly used for irrigation; some of them are of considerable antiquity.

South Malabar, and nearly all Travancore, are naturally provided near their coasts with a noble system of inland navigation, called the Backwater, which extends from Chowghaut in Malabar on the north, to Trivanderam, the capital of Travancore, within fifty miles of Cape Comorin, on the south, a distance of 170 or 180 miles. A continuation of it is in progress of being naturally formed, and is in fact navigable ninety miles farther for small boats during the rains, from Clowghaut to Cotah, sixteen miles south of Tellicherry; and all that this portion requires is, that the bed be deepened during the dry weather. The rivers descending to the sea at intervals of every eight or ten miles, would flow into and fill the deepened bed during the rains. The Backwater runs nearly parallel to the sea-shore, sometimes at the distance of a few hundred yards, at other times of three or four miles. Its breadth varies from 200 yards to twelve or fourteen miles; its depth from many fathoms to a few feet. Into this Backwater, as into a grand trunk, all the numerous rivers, flowing like so many veins from the Western Ghauts, are discharged and retained. The Backwater empties itself into the sea only by six mouths; of all which the only one navigable for ships is the mouth on the south bank of which is situated Cochin. There is a bar at this mouth, but on it there are seventeen or eighteen feet of water at spring tides.

CEYLON.

In the maritime provinces of Ceylon, particularly in Batticaloa, the internal communication is maintained by canals connecting extensive salt lakes, which have stupendous embankments, said to have been constructed by the Cingalese three centuries before the Christian era. Small vessels from India may land their cargoes at Calpentyn, in the Gulf of Manaar, and have them conveyed by canal to Columbo. In the southern parts, where the rains are copious, canals are not less useful in draining the low lands than in the conveyance of produce; whilst in the northern districts, owing to the frequent droughts, they are in the greatest request for irrigation. There are rivers in Ceylon which might be rendered navigable to a considerable extent. Mr Brook, in tracing the course of the Maha Villagunga River in 1825, came on the ruined tracks of several very extensive canals, one of which had been from five to fifteen feet deep, and from forty to 100 feet wide, and which, according to the natives, had been cut by people forty feet in height.

EUROPE.

Both Greeks and Romans failed in their repeated attempts to cut a canal through the Isthmus of Corinth. The Romans indeed were more successful in some of the branches which they cut for drainage from the Rhine; though these and others of the sort are now likely soon to be all cut off, or closed next the Rhine by locks. But the honour of properly introducing artificial navigation into Europe seems to be due to Italy and Holland, in both of which countries it has long been practised to a considerable extent, though their canals were made principally for the purposes of irrigation and of drainage. It is now computed that about the twenty-sixth part of Holland is taken up by canals, one of which is of uncommon dimensions.

They have been gradually introduced into the different countries of Europe, and to such an extent that, by means of canals and rivers, an internal water communication now connects various parts of the great seas which surround that quarter of the globe.

The Caspian is connected with the Baltic through the Wolga, the great lake Ladoga, and intervening canals; and the Baltic is also connected with the Black Sea through other rivers and artificial waters.

The Ladoga Canal, formed along the southern shore of that lake, for the sake of a better navigation, extends from Schluselburg to New Ladegaat, at the mouth of the Volkof, a distance of sixty-seven miles and a half, on one level, with a guard-lock at each end. This canal is seventy feet wide; and the depth of water, according to the season of the year, varies from seven to ten feet. To such an extent has inland navigation been carried in Russia, by connecting rivers and lakes by canals, that, with the exception of one interruption or portage of sixty miles, goods may be conveyed by water 4472 miles, from Petersburg to the frontiers of China; and also from the same capital to Astracan, a distance of 1434 miles.

The Bega Navigation, in Hungary, extends about seventy-three miles, from Fascet through the Bannat by Temeswar to Becskerek, whence vessels pass by the Bega into the Theiss, a little above its junction with the Danube. The Canal of Francis, again, extends from the Danube by Zambor to the Theiss, which it joins near Földvar, being sixty-two miles in length. The summit rises only twenty-seven feet.

On the west, the German Sea communicates with the Baltic likewise by the Canal of Kiel through Holstein, and by the Gotha Navigation through Sweden. The famous Canal of Languedoc, in the south of France, forms a communication between the Mediterranean and the Atlantic; and the equally famous and more capacious Caledonian Canal, in the north of Scotland, forms a similar communication between the German and the Irish Seas. Most of the great rivers and many lakes in other parts of Europe are also connected by canals, thereby greatly facilitating the intercourse between different nations, as well as between different parts of the same state. In the north of Germany, the Elbe,¹ the Oder, the Vistula, and the Niemen, are so connected by canals as to form a water communication over an extent of about 500 miles, viz. from the frontiers of Russia to the city of Hamburg, and running nearly parallel to the shores of the Baltic, at a distance of 100 miles. This is often called the Prussian Navigation.

The Canal of Kiel joins the river Eyder with the bay of Kiel, on the north-eastern coast of Holstein; thus forming a navigable communication between the German Sea and the Baltic, and enabling vessels to pass from the one to the other, without performing the long and difficult voyage round Jutland, and through the Cattegat and the Sound. The Eyder is navigable for vessels not drawing more than nine feet water, from Tonningen, near its mouth, to Rendsburg, where it is joined by this canal, which communicates with the Baltic at Holtenau, about three miles north of Kiel. The length of the canal is about twenty miles and a half, exclusive of about six miles and a half of what is principally river navigation, but attended with considerable difficulty, from shifting sand-banks. The canal is about ninety-five feet wide at top, fifty-one and a half at bottom, and nine and a half deep. Its summit rises twenty-four feet and a third above the sea, by six locks.

The Gotha Navigation in like manner connects the Cattegat at Gottenburg with the Baltic at Soderkœping. It

¹ According to Berghaus, the waters of the Elbe will not be navigable twenty-four years hence, if they continue to diminish at the same rate as they have done for the last fifty years; but attempts are being made to deepen it by dredging. Many other inland waters are said to be on the decrease, particularly the Caspian.

Navigation,
Inland.

Navigation,
Inland.

consists partly of canals and partly of the river Gotha and the lakes Wener, Wetter, &c. The late Sir Thomas Telford visited and was consulted in several parts of this work, which is said to be a masterly performance. The navigations, however, in the northern and interior parts of Europe are sadly interrupted by frost during a great part of the year, and therefore merit less notice.

Holland.

Canal of
Amster-
dam and
Nieuwdiep.

The canals of Holland are innumerable; but, on account of the smallness of that country, and our narrow limits, we shall only notice the great ship canal of Amsterdam and Nieuwdiep, which is one of the most magnificent and capacious in the world. It was constructed to afford a safe and easy passage for large vessels between Amsterdam and the German Sea; for although the roadstead in front of this city has forty feet of water, yet, on the pampus or bar, where the river Ye enters the Zuyder Zee, there are only ten feet; and therefore any considerable ship must only be partially loaded when passing this bar. The Zuyder Zee being everywhere full of shallows, all ordinary means of improving the access to Amsterdam necessarily failed; and this seems to have suggested the idea of constructing a great ship canal from this city to Nieuwdiep, near the Helder, the most northern point of the province of Holland. The direct distance is forty-one miles, but along the track of the canal it is about fifty and a half. The width at the water's surface is a hundred and twenty-four feet and a half, at the bottom fifty-six, with a depth of twenty feet nine inches. Like most of the Dutch canals, its level is that of the highest tides, and it receives its supply of water from the sea, but which at neap tides has to be raised by a steam-engine. The design of the high level is no doubt to exclude mud. This canal is crossed by about eighteen drawbridges. It has tide-locks only, and these are, of course, at the extremities; but between them there are, besides, two sluices with flood-gates. The locks and sluices are double, that is, there are two in the breadth of the canal. There is a towing path on each side, and the water is broad enough for two frigates to pass. This canal was begun in 1819, and finished in 1825. From the Ye at Amsterdam, where the canal begins, between artificial embankments, it proceeds north to Purmerend, then west to Alkmaar Lake, again north by Alkmaar to within two miles of the sea near Petten, from which it runs nearly parallel to the coast till it joins the sea at the fine harbour of Nieuwdiep. The Helder is the only place on the shores of Holland which has deep water, and this is owing to its being opposite the Isle of Texel, which, by contracting the water to about the breadth of a mile, occasions a current sufficient to scour and deepen the channel. Had it not been for the shallow water, a canal of half the length might have connected Amsterdam with the German Sea.

France.

By means of its fine rivers, France was naturally possessed of a considerable inland navigation; but it has, besides, many excellent canals, and in various places this extensive country is well adapted for a great many more. We can, however, only give a brief description of its principal canals, some of which are of very recent construction, or not quite finished.

Languedoc
Canal.

Languedoc Canal, connecting the Bay of Biscay with the Mediterranean, commences in the port of Cette in the bay of Lyons, from which it proceeds in a westerly direction through the lake of Thau, passing by Agde, Beziers, and, through a tunnel of 181 yards at Malpas, thence

by Sommail to Carcassonne. From this the course is north-west by Castelnaudary to Naurouse, which is on the summit-level; and to this it has ascended in all 621½ feet, by seventy four locks. The remainder of the track continues north-west to its termination in the river Garonne at Toulouse, with a total descent of 207 feet by twenty-six locks. The entire length is 241,146 metres, or about 148 miles; breadth at top sixty-one feet, at bottom thirty-four, with a depth of six feet and a half. The total length of feeders is about forty-nine miles.

This great canal was begun in April 1661, and finished in June 1681. The rest of its history is given at great length in most works on inland navigation. But although usually ascribed to the genius and skill of Paul Riquetti, intendant of the province of Languedoc, it is very questionable how far he was qualified for such a vast and difficult enterprise, in which he had had no previous experience. Nay, from a comparison of the different statements, it appears that, in place of engineer, Riquetti had been rather the contractor for the whole works, and had advanced one fourth of the outlay, for which his descendants still draw a considerable revenue from the canal. According to General Andreossi,¹ the works were planned and conducted by a relative of his, François Andreossi, an Italian engineer, who had had experience in the construction of canals in his own country, and who was employed by Riquetti to conduct this great work.

The Canal of Narbonne is a branch running south from Narbonne. the Canal of Languedoc to Narbonne, where, uniting with the Robine, the line is continued to the sea considerably to the south-west of Cette.

The Canal of Arles and Bouc was undertaken in order to avoid the shifting sands which render the navigation of Bouc. the mouths of the Rhone difficult and dangerous. Besides, it affords an outlet to the superfluous water of the district, by which means lands formerly useless may be rendered valuable. This canal extends twenty-seven miles and a half along the east bank of the Rhone, from Arles on that river to the port of Bouc in the Mediterranean. It is furnished with four locks. Being intended for sea-going vessels, it is sixty-eight feet wide at the top, forty-four at bottom, and fully six feet deep. The sides are raised three feet above the highest floods of the Rhone.

The Canal of Beaucaire is very similar to that of Arles and Bouc, was made for a similar purpose, and is nearly of the same length, with four locks. It commences at Beaucaire, on the west bank of the Rhone, and extends in a south-west direction by Aigues Mortes to the sea; but from Aigues Mortes it also communicates with Montpellier and the port of Cette by means of the Canal de Grave and the Canal of the Lakes.

The Canal of Craponne commences near Arles, and runs eastwards for about thirty-five miles to the Durance. It is principally used for drainage. Several others, which branch southward from it, are chiefly employed for the same purpose, and for irrigation.

The Canal of Givors commences at that place, on the Rhone, ten miles below Lyons, and proceeds eight miles to the Gier. It was originally intended to have been continued to the Loire at St Etienne.

The Canal of the Centre commences in the Saone at Chalons, and terminates in the Loire at Digoin, from which the navigation is continued by the Canal of the Loire. It is about seventy-one miles long, rising 400 feet from the Saone by fifty locks, and falling 240 feet to the Loire by thirty locks.

The Canal of the Loire begins at Digoin, in the Canal of the Centre, from which it crosses the Loire by an aque-

Navigation,
Inland.

¹ *Histoire du Canal du Midi*, 8vo, Paris, 1800.

- Navigation, Inland.** duct of five miles, and running along the south-west side of that river, it also crosses the river Allier by an aqueduct, but still continuing on the same side of the Loire, till, a little above Briare, it re-crosses that river through its bed, and there terminates in the Canal of Briare. Its whole length is 134 miles, with forty-five locks for a rise and fall of 317 feet. It was begun in 1822, and was nearly finished at the end of 1836.
- Briare.** The Canal of Briare, connecting the Seine with the Loire, was the earliest important project of the sort in France, and the first in that country which had locks carrying it over a height. It was begun in 1605, and finished in 1642; but the works had been suspended from 1610 to 1639. The length is thirty-four miles and a quarter, but the breadth varies from twenty-five to thirty-two feet. It begins in the Loire near Briare, ascends by Ouzonne along the side of the Trezée River, by Rogny, where there are seven locks; then passes by Chatillon and Montargis, and near Cepay joins the river Loing, a tributary of the Seine.
- Loing.** The Canal of Loing is a prolongation, for about thirty-three miles, of the Canal of Briare, from Montargis to the Seine, near the city of Moret. It descends 137 feet by twenty-one locks.
- Orleans.** The Canal of Orleans connects the Canal of Loing near Montargis with the Loire near Orleans. The length is about forty-five miles, with twenty-eight locks for a rise of $137\frac{1}{2}$ feet from the Loing, and a fall of ninety-eight to the Loire.
- Nivernais.** The Canal of Nivernais begins in the Yonne at Auxerre, and ends at Decize, near the junction of the Aron with the Loire. It is 103 miles long, with 117 locks for a rise and fall of 746 feet. It is only partially in use, but is expected to be finished in 1838.
- Berry.** The Canal of Berry, or of the Cher, consists of three branches united at one point near Khimbé. Their total length is 186 miles, with 110 locks for a rise and fall of 757 feet. The works are unfinished, and the navigation only partially in use.
- Layon.** The Canal of Layon consists of the river Layon made navigable for thirty-five miles up from its mouth at Chalonne on the Loire. It has twenty-eight locks, and is principally used for the carriage of coals.
- Nantes and Brest.** The canal from Nantes to Brest was intended principally for conveying materials and stores during war to the largest and most important arsenal of France. It is composed of three canals passing successively from the basins of the Loire, of La Vilaine, and of Blavet, to the river Alne, which joins the harbour of Brest. Its total length is 218 miles, with 238 locks for a rise and fall of 1711 feet; but there are about seventy miles not yet finished.
- Blavet.** The Canal of Blavet, which is only a branch, towards the sea, of the Nantes and Brest Canal, begins at Pontivy and ends at Hennebon. Its length is thirty-four and a half miles, with twenty-seven locks for a rise and fall of 162 feet. From Hennebon the Blavet is navigable to the sea.
- Ille and Rance.** The Canal of Ille and Rance is designed to open a navigable communication between the Channel and the Bay of Biscay, across the peninsula of Bretagne; and also to connect, through the Canal of Nantes and Brest, the ports of Nantes, Brest, and St Malos. It is fifty miles long, with twenty locks for an ascent of 129 feet on the side of the Vilaine, and twenty-eight locks for 193 feet on the side of the Rance. This canal was begun in 1804 and opened in 1832, but the reservoirs are scarcely yet completed.
- River Isle.** In the course of the river Isle, between Perigueux and Libourne, which is eighty-four miles and a half, the difference of level is 237 feet. It was therefore naturally unfit for navigation. To remedy this, it has lately been furnished with thirty-nine locks, and various other improvements have been made on the channel to render it navigable.
- Navigation, Inland.** The Canal of the Rhone and Rhine connects the basins of these two rivers, commencing on the Saone near St Jean de Losne, and ending near Strasburg. It is sometimes called the Canal of Alsace. The entire length is 203 miles, including the branch of sixteen miles and one third from Mulhausen to Huningue, near Basle. The principal line has 160 locks, and the branch four: there are also thirteen sluices. There is a rise of 550 feet on the side of the Saone, and a fall again of 658 on that of the Rhine. This canal was planned about the middle of last century; the part between the Dôle and the Saone was begun in 1784 and finished in 1790; but the whole line was only opened in 1834.
- Burgundy.** The Canal of Burgundy, uniting the basins of the Seine and of the Rhone, and thus forming part of perhaps the shortest navigable line from Havre de Grace to Marseilles, has one end at La Roche-sur-Yonne, and the other at St Jean de Losne, on the Saone. Its entire length is 141 miles, with 191 locks; it rises 612 feet from the Saone, and falls again 923 feet towards the Yonne. It has a tunnel of two miles. It was begun in 1775, and, after various interruptions, opened in 1832. There has been a deficiency of water in the dry season, but possibly this may be remedied.
- Ardennes.** The Canal of Ardennes, connecting the valleys of the Aisne and the Meuse, begins at Doncherry, on the Meuse, and joins the Aisne at Semuy, whence it is continued on the one side to Neufchâtel, and on the other to Vouziers. It has forty-nine locks to overcome a difference of level of fifty-two and a half feet next the Meuse, and $355\frac{1}{2}$ towards the Aisne. The total length is sixty-one miles.
- The Canal of the Ourcq is only the river of that name Ourcq rendered navigable for twenty miles, principally to supply Paris with water, and to turn mills.
- The canal from the Seine to the Seine, viz. from near Seine to St Denis to the basin of the arsenal, near the Pont du Jar-din du Roi, is about eight miles long, and was made to avoid the bridges of Paris, and a loop or bend of the river amounting to about seventeen miles. It consists of three parts: 1st, The Canal of St Denis, which is four miles and a quarter long, with twelve locks; 2d, about one mile of the Canal de l'Ourcq; and, 3d, the Canal of St Martin, which, including the basin of the arsenal, is about two miles and three quarters.
- The Canal of St Maur is a cut of three quarters of a mile, to avoid a bend of eight miles in the Marne, about two miles and a half above its junction with the Seine. It has often been proposed to cut off other bends in these rivers. Several of the long narrow loops in the Seine, near Rouen, might be easily cut off with great advantage; but the river is in general so ill suited for navigation on other accounts, that a separate canal, as has long been proposed, would be greatly preferable.
- The river Oise forms the channel through which the canals of the north, as well as the Scheldt, the Somme, the Meuse, and the Aisne, communicate with Paris. The importance of keeping it in a proper state for trading vessels is therefore sufficiently obvious. A lateral canal of seventeen miles was opened in 1828. It connects two points on the river twenty-eight miles distant along the course, and avoids a difficult and dangerous navigation to that extent. The towing and pilotage of a large boat, which now cost only four or five francs, along the canal, formerly cost 200 along the part of the river for which the canal is substituted. The traffic has of course increased remarkably.
- The Canal of the Somme, which is part of a navigable line connecting Paris with the sea, is ninety-one and a half miles long from its commencement, near St Limon, to its termination at the mouth of the Somme. It has twenty-three locks, with a rise and fall of 178 feet.

Navigation,
Inland.
St Quintin.

The Canal of St Quintin commences at that place on the river Somme, and proceeds by Omini, Le Trouquoi, Bellinglise, Riqueval, and Maquincourt, to Cambray on the Scheldt, a total distance of thirty-two miles and two thirds. From the commencement to the lock of Trouquoi, at the end of the summit, is about four miles, rising thirty-three feet and a half by five locks. The summit-level extends about thirteen miles and a quarter. In this there are two tunnels; one of 1191 yards at Trouquoi, and another of the very great length of three miles and three-fifths at Riqueval. Their width is twenty-six feet and a quarter. The remaining fifteen miles and two fifths to Cambray descend 123½ feet by seventeen locks. From this the navigation may either be continued along the Scheldt, or by the Canal of Lille or that of St Omer, the river Deule, &c. to the sea at Calais, Gravelines, Dunkirk, Furnes, Ostend, &c.

Spain.

Spain, from its abounding in great valleys separated by rugged mountains, is not the most suitable country for inland navigation. But its principal rivers, the Ebro, Guadalquivir, Guadiana, Tagus, Douro, and Minho, are to a considerable extent navigable, have their sources in the middle of the kingdom, and fall into the Atlantic Ocean and Mediterranean. These, and various other rivers of less note in Spain, might easily be connected by navigable canals, so as to form a ready communication between many of the interior districts of that extensive country, and between these again and the sea. In this, as in many other respects, the prosperity of Spain has been greatly impeded by superstition, priestcraft, changes of dynasties, and the frequent wars in which it has been involved, so that it has accomplished very little indeed in inland navigation. An early project of the sort was, however, effected by the Saracens, who formed a canal from the city of Grenada to the navigable river Guadalquivir, which falls into the Bay of Cadiz. But the Romans, it is said, had long before this formed an aqueduct to convey fresh water to Cadiz, from springs more than thirty miles distant.

In 1776 a canal was projected, and partly executed, to form a communication between Carthage and the river Gualantin, at a distance of more than 100 miles. In 1784, a survey was made of a canal, which, beginning near the Escorial, should proceed to join the Tagus, thence to the Guadiana, and terminate in the Guadalquivir, above Andujar. It was partly executed. It is chiefly in the north of Spain that canals have been constructed. A line projected in Old Castille, from Segovia to Olea, near Reynosa, is ninety-nine miles long, exclusive of the principal branch to the cities of Castille and Leon. Another canal has been projected in the province of Campos, to the west of Pisuerga, to pass by Medina de Rio Seco, and at Grisotu to unite with the Canal of Castille. The Emperor Charles V. of Germany proposed a canal to be carried along the valley of the Ebro, and onward to the Bay of Biscay. It was intended to receive the waters of the Ebro at Tudela, in Navarre, and thence descend towards Saragossa and Quinto.

Great Britain.

General observations.

Long after artificial canals had been introduced on the Continent, England contented herself with merely endeavouring to improve the navigation of her rivers. The principles on which the earliest acts of parliament were framed for this purpose, consisted in deepening, straightening, and embanking the rivers, where necessary; and, by means of sluices and weirs, penning up or lowering the surface of the water, for the purpose of producing "flashes," and overcoming the obstructions to navigation. Long experience, however, showed that navigations of this sort were liable to perpetual deterioration, from the alterations produced in

the regimen of the rivers by such artificial works, which frequently augmented instead of remedying the evil, whilst they obstructed the general drainage of the country. The circuitous navigation, and the trackage against the stream, were at all times laborious and dilatory. These difficulties suggested the propriety of deserting the natural bed of the river, and led to the formation of separate cuts, with the pound-locks, and the various contrivances which were subsequently invented to supersede their use. Until the invention of the lock, therefore, very little could be done in the way of inland navigation, except in the fens, when connected with drainage. Accordingly, the most ancient attempts of this kind are to be found in the Carr and Foss Dikes by the Romans; the former skirting the uplands and fens, from the river Nene at Peterborough, to the river Witham, near Lincoln, by a canal of forty miles; and the latter connecting the Witham at Lincoln with the Trent above Gainsborough, by a level cut of eleven miles.

In England, the artificial system of navigation has been carried on for more than half a century, on a scale no less extensive than the drainage. The passing of an act in 1755 for constructing the first artificial canal in England, which was that of Sankey Brook, the completion of that work in 1760, and the formation of the Duke of Bridgewater's Canal in 1761, opened the eyes of the nation to the vast advantages that were likely to be derived from artificial navigation, and led to the system of direct and indirect communication, which has united all the great rivers and ports of the kingdom. In Scotland, the progress of inland navigation, although less rapid, has been proportionally successful. As early as the reign of Charles II., the idea of joining the Forth and Clyde is said to have originated with his brother, James Duke of York; and, if true, forms a singular exception to the rest of his history. The subject was again resumed in 1722; in 1760 a survey was made by Messrs Mackell and Watt; and in 1766 that great work was commenced by Mr Smeaton, and completed in 1790. Between the above periods, also, Mr Watt made many reports on the improvement of the Clyde, and on the proposed Monkland, Crinan, and Caledonian Canals; and, in 1802, Mr Telford was employed to make surveys of the whole coast and interior of Scotland, with a view to improving its harbours and rivers, and which ultimately led to the execution of the Caledonian Canal by that able engineer.

The following is a concise account of the principal inland navigations of Britain, arranged alphabetically.

Aberdare Canal, about six and a half miles long, is a branch of the Cardiff or Glamorgan Canal, from near the aqueduct of the latter over the river Taff. It terminates at Ynys Cynon, three quarters of a mile from Aberdare. From this canal proceed railways to the iron-works of Godleys, Abernaut, Aberdare, &c. and also to a steep descent to the Neath Canal, up which waggons are drawn by a steam-engine. It has been proposed to unite the Aberdare Canal with that of the Neath.

Aberdeen Canal extends about nineteen miles from the tideway in the port of that town up the valley of the river Don to Inverury. It rises 169 feet by seventeen locks, of which fifteen are near the city. The width of this canal is twenty-three feet, and the average depth three feet nine inches.

The Adur River, in Sussex, has been rendered navigable southward from Binesbridge, in West Grinstead, to the sea at Southwick, below Shoreham Harbour, a distance of fourteen miles.

Aire and Calder Navigation. The river Aire, in Yorkshire, is navigable for sloops of sixty tons for forty miles, from its mouth in the Ouse at Armin, up to Leeds, where the Leeds and Liverpool Canal begins. The river Calder falls into the Aire about ten miles below Leeds, and is navigable about ten miles to Wakefield, where the Calder

Navigation,
Inland.

Navigation,
Inland.

and Hebble Navigation commences. From the Aire and Calder not less than three canals and their branches have been carried across the central ridge of England to Manchester and Liverpool, forming an important water communication between that port and Hull, and between these and the intervening manufacturing districts.

Alford Canal is to extend from the town of Alford, in Lincolnshire, to the sea at Anderby, a distance of six and a half miles, with a depth of eight feet.

The Ancholm and Caistor Navigations join the Humber above Hull. The old meandering course of the river Ancholm is changed into a nearly straight canal twenty-six miles long, and running nearly from south to north. The Caistor Canal, which meets it from the east, is about four miles long. They serve the double purpose of draining a marshy track, and affording a communication to the towns of Caistor and Market-Raisin.

Andover Canal begins in the tideway at Redbridge, in Southampton Water, and proceeding northward up the east side of the Anton River, ends at Barlows Mill, near Andover. It is about twenty-two miles and a half long, and descends 177 feet towards the sea. From near its middle the abandoned Salisbury Canal branches off to the west, whilst from its south end the Southampton Canal passes eastward to the Itchin River.

Arun River Navigation begins at Newbridge, near Wimborough Green, and proceeds thirteen miles, partly by the course of the river, and partly by cuts to Arundel Haven. From this the river Arun itself has been rendered navigable all the way to Arundel Port, making a total length of twenty-six miles and a quarter.

Arundel Canal, see Rother River.

Ashby-de-la-Zouch Canal passes by a very winding course northward for forty miles, to the town of that name, from the Coventry Canal at Marston Bridge, near Newneaton. The first thirty miles and a half, together with parts of the Oxford and Coventry Canals, form one level of seventy-three miles; but on the next two miles there is a rise of 140 feet to the summit-level, which then continues four miles north of the great tunnel, and in the next quarter of a mile the fall is eighty-four feet. One branch of about two miles goes off to Swadlingcote Colliery; another almost a mile falling twenty-eight feet to Stainton Lime-works; a third 200 yards to Hinckley Wharf. Besides, there is a railway of about six miles to Ticknall Lime-works, and another of five miles to Measham Collieries. Near Ashby-de-la-Zouch is a tunnel of 700 yards, and near Snareston another of 200 yards. At Boothorpe a steam-engine raises water, which passes in a feeder to the summit-level. This canal passes one aqueduct bridge at Shakerton, and another at Snareston.

Ashton and Oldham, or Ashton-under-Lyne, Canal, branches off from the Rochdale Canal at Manchester. It passes Fairfield, and terminates in the Huddersfield Canal at Duckenfield Bridge. The length is eleven miles, and the rise 152 feet. A branch of a quarter of a mile connects it with Peake Forest Canal, another of one mile goes up to the town of Ashton, a third of nearly four miles to New Mill and to Park Collieries, and a fourth of six miles to Stockport.

Avon River, Hampshire, was once made navigable from the sea at Christchurch north to Salisbury, a distance of 36 miles. The works were, however, very insufficient, and were allowed to go to ruin, and the river is now only navigable two miles in the tideway.

Avon River, Warwickshire and Worcestershire, is navigable from Stratford-upon-Avon, near the junction of the Stratford Canal, to the Severn at Tewkesbury, a distance of forty-three miles and three eighths, in a south-westerly direction. This navigation is of great use to the towns of Pershore, Evesham, and Stratford.

Avon River, Gloucestershire and Somersetshire, is navigable from Bath, near the commencement of the Kennet and Avon Canal, and passes by Bristol to the Severn at King's Road, a distance of twenty-six miles and a half in a north-west direction. Its course formerly lay through the heart of the city of Bristol; but a new channel for the river has been cut on the south side of that city, two miles in length, whilst the ancient course has been converted into an excellent floating dock and harbour, which on the north receives the small river Frome, navigable only for half a mile through the city. At Morgan's Pill, six miles below Bristol, is the junction of the proposed Bridgewater and Taunton Canal.

Axe River, Somersetshire, is navigable from its mouth in Uphill Bay, Bristol Channel, eastward to Lower Weare, near Axbridge, a distance of nine miles. Near Loxton it is crossed by the proposed line of the Bridgewater and Taunton Canal.

Barnsley Canal begins in the river Calder, a little below Wakefield Bridge, and proceeds south and west over a track of fifteen miles and a half to its termination at Barnby Basin. In the first three miles it rises 120 feet by twenty-one locks, partly fed by a steam-engine. A great quantity of coal and paving-stone is conveyed by this canal. It connects the manufacturing towns in the west riding of Yorkshire.

Basingstoke Canal commences at Westley, in the Wey River, about two miles from the Thames, and proceeds westerly thirty-seven miles in Surrey and Hants, to the town of Basingstoke. It rises 195 feet in the first fifteen miles, by twenty-nine locks; the remainder is level.

Baybridge Canal, in the county of Surrey, proceeds from Binesbridge along the course of the river Arun to Baybridge, which is about three miles and three eighths. It rises fourteen feet, by two locks.

Birmingham and Fazeley Canal begins at the east end of the Old Birmingham Canal, near Farmer's Bridge, in Birmingham, and passes through a part of the town, thence by Newhall, Middleton Hall, and Drayton manor-house, to the Coventry Canal at Fazeley, near Tamworth, a distance of fifteen miles, with a fall of 248 feet. The remaining five miles and a half to Whittington Brook are level.

Birmingham (Old) Canal, twenty-two miles and a half long, proceeds from Farmer's Bridge, passes Smethwick and Oldbury. It then passes to the east of Tipton and Wolverhampton to the Staffordshire and Worcestershire Canal, near Autherley, where it descends 132 feet by twenty-one locks. The supply of water is chiefly drawn from old coal-mines by steam power. This canal communicates with the Worcester and Birmingham Canal at Birmingham, with the Dudley Canal near Tipton Green, and with the Wyrley and Essington Canal near Wolverhampton. By means of its canals, Birmingham communicates with the most important towns in England and Wales.

The Birmingham and Liverpool Junction Canal commences in the summit-level of the Staffordshire and Worcester Canal near Tettenhall, about a mile from Autherley, the place where the Birmingham Canal communicates with the Staffordshire and Worcester Canal. Its course is north-westerly to its termination in the United Navigation of the Ellesmere and Chester Canal near Dorford Hall. The total length is thirty-nine miles, with a fall of 175 feet by twenty-seven locks.

The Blyth River, Suffolk, is navigable from Halesworth Bridge to the haven of Southwold, about nine miles, descending by four locks.

The Bourn Eau River is navigable from the river Glen in Deeping Fen, for three and a half miles, in a north-west direction, to the town of Bourn.

The Bradford Canal extends from the Leeds and Liver-

Navigation,
Inland.

Navigation,
Inland.

Navigation,
Inland.

pool Canal, near the village of Shipley, to the town of Bradford, a distance of three miles, rising eighty-six feet by ten locks, which are each sixty-six feet long and fifteen wide.

The Brecknock and Abergavenny Canal proceeds from the Monmouthshire Canal, about a mile south of Pontypool, and, crossing the river Avon by an aqueduct, continues for fourteen miles and a half on a level line to the west of Uske, whence it goes on to Brecon, eighteen miles and a half, with a rise of sixty-eight feet, the entire length being thirty-three miles. Various railways proceed from this canal to the different iron and coal works in that rich mineral district.

The Bridgewater Canal, which has already been noticed, may be called the root and model of canal navigation in England, being the first which crossed hill and valley in that country. The general direction of its principal line, which extends from Manchester to Runcorn-Gap, in the tide-way of the Mersey, amounting to about twenty-seven miles, is nearly south-west, in the counties of Chester and Lancaster, and, except the last 600 yards, in which there is a fall of eighty-two feet and a half by ten locks, the whole of this branch, together with twenty-eight miles of the other branches, and eighteen of the Grand Trunk Canal, into which it joins, in all seventy-three miles, are on one level. The determination of preferring one level led to the construction of such tunnels, aqueducts, and embankments, as were truly formidable in that infant state of canal operations. Nothing, however, could shake the fortitude and perseverance of the Duke of Bridgewater, or baffle the ingenuity of his talented engineer, James Brindley. The original design of the part of this canal first projected was for conveying coals from the duke's mines at Worsley to Manchester, a distance of about seven miles; but when the canal had reached the road from Warrington to that town, it was resolved to vary the line by crossing the river Irwell at Banton Bridge, and proceed to Manchester up the south side of that river, with a branch to Longford Bridge. From this latter place it was next proposed to carry the canal past Altringham, to the river Mersey, at Hempstones in Cheshire; but this line was partly changed, and the canal finally carried by Preston Brook to Runcorn. In 1795 an extension was made from Worsley Mill to the town of Leigh in Lancashire, with a branch to Chat Moss. The branches of this canal in the collieries under ground are together said to exceed eighteen miles in length.

It is said, that notwithstanding the great and increasing traffic upon the Liverpool and Manchester Railway, there has been no falling off in the canal business between these towns, but a considerable increase.

The Bridgewater and Taunton Canal has been projected to commence at Morgan's Pill in the river Avon, six miles below Bristol, and to pass south-westerly by Bridgewater to Taunton, a distance of forty-two miles and a half.

The Britton Canal commences in the river Neath, directly opposite the end of the Neath Canal, and runs south-west to Swansea Harbour in the river Tawe, a distance of four miles and a quarter.

The Bude and Launceston Canal commences in Bude Haven, within the port of Padstow, from which it runs south-easterly for five miles and three fourths to the Red Post, and thence easterly by a very crooked course of fifteen and five eighths farther to its termination at Thornbury. From the Red Post a branch of nineteen miles passes south by a very winding course along the west bank of the river Tamar to near Launceston. From Veala a branch of three miles and seven eighths passes to Virworthy; and another of one mile and a half from Burmsdon to Moreton Mill. Several inclined planes are used on this canal and its branches.

Bure River, Norfolk, is navigable from the town of Ayls-

ham by a very crooked south-easterly course to its mouth in the Yare, near the sea at Yarmouth, a distance of forty miles by the river; at Horning Marsh it receives the Ant River, a navigable branch of eight miles, proceeding from the termination of the North Walsham and Dilham Canal at Wayford Bridge; and at Thurn it receives the Thurn River branch of seven miles from Hickling Broad.

Burn River, see Larke.

Bury River is a wide estuary entering from the west, between the southern parts of Carmarthenshire and Glamorganshire, and is navigable for about twelve miles inwards to the mouth of the River Loughor, which again continues the navigation two miles farther up the country northwards, and is joined by various railways.

The Bute Ship Canal commences in Cardiff Harbour, near the mouth of the river Taff, in Glamorganshire, running north to Cardiff Moors, and thence, parallel with the Glamorganshire Canal, to near Whitmoor Lane, on the south side of the town of Cardiff, where it terminates. The part from the commencement to Cardiff Moors is called the *Entrance Ship Canal*, and is almost two miles long, and 33 feet deep. The upper part, called the *Basin*, is about 1500 yards long, and twenty feet deep, with two short cuts to the Glamorganshire Canal.

Caister, see Ancholm.

Calder and Hebble Navigation commences at Fall Ing, near Wakefield, in the Aire and Calder Navigation, and proceeds, partly by the river, and partly by side cuts and locks and weirs, twenty-two miles, to Sowerby Bridge Wharf, near Halifax, where it enters the Rochdale Canal, having descended 192½ feet by twenty-eight locks.

The Caledonian Canal. A valley remarkable for its uniformity, straightness, and depth, and extending from sea to sea, between two parallel ranges of steep mountains, divides the Highlands of Scotland into two nearly equal parts. The general direction of this chasm is from north-east to south-west, making an angle of about 35 degrees with the meridian; and, besides being entered at each extremity by an arm of the sea, viz. by the Moray Frith on the north, and Loch Linnhe on the south, the rest of its bottom is for the most part occupied by a concatenation of rivers and lakes. The remarkably elongated form and contiguity of these lakes had long ago suggested the facility of forming an inland communication between the Atlantic Ocean and the German Sea. For, to accomplish this important object, it seemed sufficient to connect these lakes and the friths by several short canals, amounting together to twenty-three miles, and thereby obtain a navigable line to an extent of more than 100 miles; and this was farther recommended by the summit-level only rising ninety-four feet and a half above the sea. So far back as the year 1773, this line had been surveyed by the celebrated James Watt, who reported favourably of it, and proposed that the lakes should be connected by a canal of a very moderate size. Nothing farther, however, was done till early in the present century, when the subject was taken up by government, and new surveys were made by Messrs Jessop and Telford, who recommended a canal of such dimensions as should admit frigates of thirty-two guns, and the greater part of merchant ships, particularly that class which trade between the Baltic and the ports of Ireland and the west coast of Britain, as by this means a tedious and often dangerous navigation by the Orkneys would be avoided. The work was next set about at the public expense, and under the direction of Mr Telford, who gave to the undertaking the name of the Caledonian Canal. The dimensions then proposed by him, and which have been in a great measure adhered to, were a width of fifty feet at bottom, 120 at top, and a depth of twenty feet; the locks to be from 170 to 180 feet long, forty wide, with a depth of twenty feet of water besides the lift or rise. These measures have been followed

Navigation,
Inland.

in the case of the locks, but as yet the canal has only been excavated to the depth of fifteen feet in the summit-level, though the width has been slightly increased to 122 feet at top, but with a break in the slope such that there is on each side a horizontal shelf six feet broad at the depth of two feet under the surface of the water. The design of this break in the slope of the sides is to keep large vessels from approaching too close to the brink of the canal, and destroying the upper edge of the banks, either by contact or by the eddy produced between the vessel and the sides of the canal. It serves, besides, to prevent any loose earth which may crumble in at the margin from going down to the bottom, and retains it there till it be convenient to clean it out.

It was not deemed advisable that the rivers which flow through or from the lakes in the valley should form any part of this line of navigation; but on entering from the north we find the Caledonian Canal commencing with a sea-lock at Clachnacarry, in a sheltered bay of Loch Beaul, which is the more inland part of the Moray Frith. The sea-lock here is about two miles north-west of Inverness, and three quarters of a mile west of the well-frequented ferry of Kessock, which is near the mouth of the river Ness. In order to have sufficient depth of water at ordinary neap-tides, it was necessary, on account of the flatness of the shore, to place this lock about 400 yards within sea-water mark, an operation which was attended with no small difficulty, on account of the softness of the bottom. This lock is 170 feet long, forty wide, with a lift of eight feet and a half; and proceeding from it, the canal is formed by embankments till it passes the sea-mark, where another lock of the same size, with a lift of six feet, is built on firm ground. Next, on the south of this, is the Muirton basin, 967 yards long and 162 broad, with a wharf for the trade in that quarter, being about a mile from Inverness. At the southern extremity of this basin is a swivel or swing bridge for the public road between Beaul and Inverness; and then four locks, which, however, from their being connected, have only five double gates in the whole. These raise the canal thirty-two feet, which puts it on the ordinary summer level of Loch Ness. Each lock is 180 feet between the gates, and forty wide. From this the canal proceeds by gentle windings till it meets and runs along the north-west bank of the river Ness to the small lake Doughfour, which is about 2100 yards long, and from five to nine fathoms deep, and is six miles and a half from Clachnacarry. It communicates with Loch Ness by the pass of Bona Ferry. The intended line of canal being on the west side of the river Ness, which in three different places approached close to the steep sides of the hills on the west, it was necessary to alter the course of that river, so as to obtain room for the canal without cutting into the hills. At the entrance to Loch Doughfour is a regulating or guard-lock, without any lift, to prevent any overflow from the lake. It is 170 feet long, and forty wide. It was necessary to deepen this small loch in several places by dredging, and to raise it six feet to the level of Loch Ness by a wear and embankment. The next part of this navigation, and by far the most extensive lake in it, is Loch Ness, a fine sheet of water, about twenty-three miles and three quarters long, and from one to 1.5 mile broad. Its depth is so great that it never freezes, being from five to 129 fathoms, and along the middle it averages 100. It affords good anchorage at each end, and also in a few bays, although the sides of this lake are generally straight. It was proposed to introduce buoys for more convenient mooring. There are nowhere in it either rocks or banks detached from the shore.

Loch Ness receives the river Oich in its western shore, not far from its southern extremity, and a little south of this the canal leaves the lake, whilst almost quite at the

southern end stand the fort and village of Fort Augustus. From this the canal ascends forty feet by five locks, and at Callachie, about two miles and a half farther on, it rises eight feet by another lock. Three miles more bring it to Loch Oich, where a regulating lock raises it thirty inches, so as to be even with that lake, which is on the summit-level.

To obtain a proper line for the canal upon the south-east side of the river Oich, the channel of that river has been somewhat altered. Loch Oich, which forms the summit-level of this navigation, is about three miles and three quarters long, and, on an average, a quarter of a mile broad. In one place in the middle, and at both ends, it had to be deepened by dredging. The water which falls into this lake, particularly from the river Garry, affords at all times an ample supply for the canal. Between Loch Oich and the next lake in the line, Loch Lochy, there is no natural communication. The interval is about a mile and three quarters, and rises twenty feet above Loch Oich, which, with the depth of the canal, required a cutting of thirty-five feet. Loch Lochy, which was twenty-one feet nine inches lower than Loch Oich, has been raised about twelve feet by an embankment to avoid rock-cutting, and the canal descends to it nine feet nine inches by two locks, one of which is also a regulating or guard lock. Loch Lochy is ten miles long, and averages one in breadth. In some places it is seventy-six fathoms in depth. About half a mile of the course of the river Lochy had to be shifted into a new bed to make room for the canal, which now, in its last stage, proceeds from the lake for eight miles along the north-west bank of that river over a rugged surface to the shore of Loch Eil, which is the more inland part of the frith called Loch Linnhe. A little south of Loch Lochy there is a regulating lock; and about a mile from Loch Eil there are eight connected locks, called Neptune's Stairs, by which the canal descends sixty-four feet. At Corpach shore it falls fifteen feet by two locks, and, after expanding into a basin 250 yards long and 100 broad, it finally descends seven feet nine inches by the sea-lock into Loch Eil, near Fort William.

The entire length of this navigation is sixty miles and a half, and that of the artificial part, including Loch Doughfour, is twenty-three miles and eight chains. There are in all twenty-eight locks. This canal has as yet been a most unprofitable speculation, for all it has hitherto yielded does not pay the mere expense of maintaining it. Foreigners affect to smile at the classic title of "Neptune's Stairs," which is not altogether free from vanity; but although many locks have certainly a greater lift, as, for instance, five locks rising together eighty-eight feet on the Leeds and Liverpool Canal, yet it is very unusual for gates to be so wide, and to descend twenty feet into the water, besides the eight feet of lift. The gates indeed descend five feet too low, and so do the locks, but this was done intentionally, in the expectation that the canal might yet be made five feet deeper. Amongst the wonders lately announced in Kentucky, we find locks thirty-eight feet wide, with a lift of sixteen feet. Such, however, will often spend just double the water in lowering a boat through the same height which locks with eight feet of lift would do, especially if none of the water can be withdrawn from the locks into side-ponds.

Cam, or Grant River, is navigable fourteen miles, from Cambridge to its mouth in the Great Ouse at Harrimere, above Ely. It is embanked above the fens in all its lower parts, and has sluices for making flashes of water, to enable boats to pass the shallows. There is a cut of three miles from it to Rehe, and another of three miles and a half to Burwell.

Camel River is navigable from Guinea Port, near Wade Bridge, to the sea at Stepper Point, three miles east from

Navigation,
Inland.

Navigation,
Inland.

Padstow, in the Bristol Channel, a distance of eight miles and a half by the low-water channel.

The Canterbury Navigation, or river Stour, from the city of Canterbury to the Downs at Sandwich Haven, having been very imperfect and incommodious, an act was obtained in 1825 for making various improvements on it; particularly a canal or harbour eight feet deep, from the Small Downs, commencing between the Batteries No. 1 and 2, to the river Stour at Sandwich, which is to be two and a half miles in length from the end of the proposed jetty of 1000 feet next the Downs; thence the navigation is continued in its old course sixteen miles to Fordwich, where there is a lock of six feet lift. From this to the tail of Abbots Mill, Canterbury, the length is two miles and a quarter, including three short cuts amounting together to one and a quarter mile. There is another lock of six feet lift half a mile from Canterbury. The total length is twenty miles and seven eighths.

Cardiff Canal, see Glamorganshire.

Carlisle Canal proceeds north-west from the west side of that city, and twice crossing the line of the Picts' Wall, continues by Kirk-Andrews to Wormanby, taking a westerly direction along the south side of the Picts' Wall, by Burgh; thence crossing the marshes, and passing by Drumburgh Castle and Glasson, it enters the Solway Frith at Fisher's Cross near Bowness. It is eleven miles and a quarter long, descending seventy feet by nine locks.

Carron River, Stirlingshire, is navigable from its mouth, in the estuary of the Forth, up to the village of Carron Shore, and thus far vessels drawing seven or eight feet water may ascend at neap tides; but still larger vessels come up for a shorter way to Grangemouth, where this river connects by means of a tide-lock with the Forth and Clyde Canal, and is indeed the only entrance to it from the Forth. But from the Carron Iron Works, which are situated farther up on this river, there is a cut southward to that same canal at the village of Bainsford.

Cart River, Renfrewshire, sometimes called the White Cart, is navigable for about five miles, from the town of Paisley northwards to the Clyde near Inchinnan; but this navigation is now in a great measure superseded by the Glasgow and Paisley Canal.

The Chelmer and Blackwater Navigation extends eastwards from the basin at Chelmsford to the tideway at Collier's Reach, a distance of thirteen miles and five eighths, partly by the course of the river Chelmer, and partly by cuts, viz. first, to Burleigh Mill, ten miles and seven eighths, with a fall of fifty-nine and a half feet; thence to Heybridge, one mile and an eighth, falling seven feet; and thence by a canal of one mile and five eighths to the basin at Collier's Reach, with a fall to low-water mark of twelve feet and two thirds. From this, the length of the estuary of Blackwater to the sea opposite Sales Point is about eleven miles.

Chester Canal, see Ellesmere.

The Chesterfield Canal commences in the tideway of the Trent at Stockwith, in Nottinghamshire, near the mouth of the Idle. The general direction of its crooked course is south-west to Chesterfield, a distance of forty-six miles, having a rise of 335 feet, and fall of eighty-five feet, with sixty-five locks. Between Harthill and the village of Wales there is a tunnel of 2850 yards on the summit-level.

Clyde River becomes navigable at Glasgow, and, proceeding thence westward by Govan and Renfrew, it receives the river Cart a little below that town. From this it gradually expands into a fine estuary, which, at Port-Glasgow, becomes fully two miles wide. Along the course of the river, the distance from Gorbals Bridge in Glasgow, to the mouth of the Cart, is about seven miles; thence to Bowling Bay, where it is joined by the Forth and Clyde Canal, four and a half; thence to Dumbarton harbour,

three; and thence to Port Glasgow, five. But the total length of the navigable part of this river to where it falls into the Frith of Clyde opposite Roseneath, is about twenty-five miles. Under the act 6 Geo. IV. this navigation was to be made thirteen feet deep at neap tides. The trade upon it is very extensive.

Colne River is navigable from the Hythe, near Colchester, to the sea. From the Hythe to Wivenhoe the distance is three miles and a half, and thence the river expands into an estuary extending four miles and a half farther to the sea opposite the isle of Mersea.

Conway River, Denbighshire, is navigable in the tideway from Llanrwst to its mouth at Conway harbour, a distance of thirteen miles and a half.

Coombe Hill Canal extends from this village in Gloucestershire to Fletcher's Leap on the Severn, a distance of three miles and a half, falling fifteen feet.

The Coventry Canal commences at the Trent and Mersey, or Grand Trunk Canal, on Fradley Heath, whence it goes southerly to Huddlesford, being there joined by the Wyrley and Essington Canal. It next proceeds to Fazeley, near Tamworth, where the Birmingham and Fazeley Canal locks down into it. It then crosses the Tame by Amlington, approaching the Little Anker River, running parallel to it; then by Polesworth and Hartshill it proceeds to its termination at Coventry. The whole track just mentioned amounts to thirty-seven miles and three fourths, but of this the second five miles and a half from the north end now belong to the Birmingham Canal. From Fazeley to Atherstone, about ten miles, there is a rise of ninety-six feet, by thirteen locks.

Cree River is navigable about eight miles in the tideway from Carty, near Newton-Stewart, to Creetown, in Wigton Bay.

The Crinan Canal, in Argyleshire, runs nearly south-east from Crinan, in the Sound of Jura, to Ardreshaig in the frith of Loch Fine, and is about nine miles and a half long by from twelve to fifteen feet deep, with fifteen locks. From the west it rises fifty-nine feet to the summit-level, and then falls fifty-eight feet to the east. This short ship canal tends greatly to simplify and abridge the navigation in this quarter, as it cuts off about sixty miles from the long isthmus or tongue of land called Cantire, which vessels must otherwise double or go round.

The Cromford Canal, eighteen miles in length, proceeds from the head of the Nottingham Canal by Hynor Harly, Tadmoor, and Critch, to Cromford, near Matlock. In the first four miles it rises eighty feet, and the rest is level. It has several tunnels; one at Ripley is 2966 yards long.

Crouch River is navigable in the tideway from Hull bridge, in Essex, to its mouth in the sea at Foulness, a distance of sixteen miles.

The Croydon Canal commences in the Grand Surrey Canal, near Deptford, and extends nine miles and a half southward to Croydon. It rises about 150 feet, by twenty-six locks.

Darent River is navigable about four miles in the tideway from Dartford to Longreach in the Thames.

Dart River is navigable about twelve miles and a half in the tideway from about a mile above Totness down to Start Bay in the English Channel.

The Dearne and Dove Canal commences in a side cut of the Don or Dunn River, between Swinton and Mexborough, and terminates in the aqueduct carrying the Barnsley Canal over the river Dearne. It is about nine miles and a quarter long, and rises altogether 127 feet, by eighteen locks.

Deben River, Suffolk, is navigable about nine miles and a half in the tideway from Wilford Bridge, about a mile above Woodbridge, down to the sea about four miles north of Harwich. At high water it has the appearance of a considerable estuary, and at Woodbridge and Rams-

Navigation,
Inland.

Navigation,
Inland.

holt there are docks for ship-building and commodious wharfs.

Dee River, Cheshire, is navigable in the tideway for large vessels from Hand Bridge, at the city of Chester, by a new channel of eight miles, to where it enters the estuary of the Dee; and thence by the low-water channel to the opening into the Irish Sea off Great Helbre Island, which is a farther distance of fifteen miles and a half. At Chester this river connects with the Chester Canal.

The Derby Canal commences in the Trent, near Swarkestone, and about three furlongs to the north enters the Grand Trunk Canal, having risen twenty-six feet. From this to Derby, five miles and a quarter, it rises twelve feet, and, crossing the Derwent, proceeds three miles and a quarter by Little Chester and Breadsall, rising seventeen feet, to its termination at Little Eaton. From the east bank of the Derwent a branch extends eight miles and a half to the Erewash Canal, falling twenty-nine feet.

Derwent River, in Derbyshire, is navigable from the town of Derby, with a very tortuous course, till it falls into the Trent at Wilden Ferry, below Shardlow, where the Grand Trunk or Trent and Mersey Canal connects with that river. This navigation extends about thirteen miles.

Derwent River, in Yorkshire, is navigable from Yedingham Bridge to Barmby, in the tideway of the Ouse, about seven miles below Selby, a distance of forty-nine miles and a half, viz. from Yedingham Bridge to New Malton eleven miles and a half, thence to Howsham Hall nine and a half, thence to Stamford Bridge six and a quarter, and thence to the Ouse twenty-two.

The Donnington Wood Canal commences in the Shropshire Canal, near its junction with the Shrewsbury Canal, and runs north-east, for seven miles, to Pave Lane Wharf, near Newport.

Douglas Navigation, see Leeds and Liverpool.

The Driffeld Navigation, eleven miles in length, commences at Aike Beck Mouth, in the river Hull, and ends at Great Driffeld. The first five miles is in the Hull, and the remainder by a canal. The Hull and Leven Canal, of three miles, is a branch of this.

Droitwich Canal extends five miles and three quarters from Chapel Bridge, in that town, to Hawford, on the Severn, descending fifty-nine feet and a half, by eight locks. It is fed from salt springs.

The Dudley Canal proceeds from the Worcester and Birmingham Canal, near Selly Oak in Worcestershire, and passes a little east of Hales Owen, and north of Dudley, to the Old Birmingham Canal, near Tipton. From near Dudley it proceeds to the Black Delph and Stourbridge Canals. For the first ten miles and a half it is level to the Black Delph, thence two miles to Stourbridge it falls eighty-five feet by nine locks, and in three quarters of a mile to the Dudley tunnel it rises thirty-one feet by five locks. Through the 2926 yards of the tunnel it is level; thence, in one furlong, to Old Birmingham Canal, it falls thirteen feet by two locks. The main line is thirteen miles long. There are two more tunnels, one at Lapal of 3776 yards, and another at Grotty Hill, 623 yards.

The Dun River Navigation, consisting of parts of the river Dun or Don, and short pieces of canal alternately, commences in the Ouse at Goole Bridge, and extends south-west about thirty-nine miles to Tinsley, near Sheffield, where it is joined by the Sheffield Canal. The total rise is ninety-two feet and a quarter, by sixteen locks.

Eden River has been made navigable ten miles and a half in the tideway from Carlisle Bridge, by Kirk-Andrews and Rockcliff, to Burgh Marsh Point, where it empties itself into the Solway Frith. It has been in some measure superseded by the Carlisle Canal.

The Edinburgh and Glasgow Union Canal has its western extremity at lock No. 16 of the Forth and Clyde Canal, from

the south-eastern bank of which it rises 110 feet, by eleven connected locks, to a height which enables it to be continued for thirty-one miles wholly on one level to its termination at Edinburgh. These locks are a little west of Falkirk, which the canal passes on the south, proceeding eastward through Prospect Hill tunnel of 696 yards in the solid rock, then over the Avon by a stupendous aqueduct bridge eighty feet above the water of that river. This is about two miles west of Linlithgow, which the canal passes close on the south, and continuing east six miles farther, turns south past the villages of Winchburgh and Broxburn, and then east again to the aqueduct bridge by which it crosses the river Almond; thence by Ratho to another aqueduct bridge at Slateford over the Water of Leith; and finally, to Port Hopetoun Basin at Edinburgh. This canal is forty feet wide at top, twenty at bottom, and five deep. The late Mr Telford recommended to continue the line of this canal from Falkirk to lock No. 20, at the eastern extremity of the Forth and Clyde summit, and to reserve the more depressed junction at No. 16 for the Grangemouth trade only. By this mode about nine fewer locks would need to be passed in the journey between Edinburgh and Glasgow; and both canals would require less water, especially as the Union Canal would then throw a large quantity of water into the summit of the Forth and Clyde Canal, which the latter now receives at too low a level to be of any use.

The Ellesmere and Chester Canal begins at Ellesmere Port in the tideway of the Mersey, about ten miles south-east of the port of Liverpool, proceeding south by Stoke, Wervin, and between Moston and Mollington Hall to Chester, where a short branch locks down into the river Dee. From this it passes east by the north wall of the city, then more southerly by Christleton and Beeston Castle, to Wardle Green, from which a branch goes to join a branch of the Grand Trunk at Middlewich. The main line proceeds a mile and a half from Wardle Green to near Hurleston, whence another branch proceeds to near Darford Hall near Nantwich, and connects with the Birmingham and Liverpool Junction Canal. From Hurleston the main line proceeds southward by Burland to Woodcot, and thence westward to near Whitechurch, where the canal enters Shropshire. Next, passing close by a detached part of Flintshire, it reaches the Cottage; and then continuing westerly by the south side of Ellesmere, to which there is a short branch, it turns more southerly to Francton Common, where the Llanymynech branch proceeds from it to the Montgomeryshire Canal. The direction of the main line is again westerly by Halston Hall, crossing the river Ceiriog by a fine aqueduct, then through Chirk Tunnel to the river Dee, which it passes by means of the famous cast-iron aqueduct bridge at Pont-y-Cysylte. (See the article AQUEDUCT.)

The entire length of the main line from the Mersey to the Montgomeryshire Canal is sixty-one miles, viz. to Chester, eight miles and a quarter, with a rise of forty-six feet; to Hurleston Locks, fifteen miles and three quarters, with a rise of 131 feet; to Francton Common, twenty-five miles, with a rise of 115 feet; and to the Montgomeryshire Canal, eleven miles and a half, with a fall of fifty-two feet. The branch to meet the Birmingham and Liverpool Junction Canal is two miles, and level. The branch from the Cottage to Edstaston Wharf is three miles; the branch to the town of Ellesmere is one furlong; the branch to the Ruabon Brook Railway is fully eleven miles; and that from Wardle Green to the Grand Trunk is nearly ten miles, with a fall of forty-four feet. This navigation, considering its extent, is remarkable for having been principally undertaken for agricultural purposes, the supply of towns and manufactories being a secondary consideration, though these have been greatly benefited by it. For many other particulars, see Priestley's Account of Canals.

Navigation,
Inland.

Navigation,
Inland.

The English and Bristol Channels Ship Canal was projected principally with the view of shortening and rendering more certain and expeditious the passage of vessels trading from the Bristol Channel, the ports of Ireland, and the western ports of Britain, to the English Channel. Its length is to be forty-four miles and five eighths from its southern extremity, at Beer Roads, Seaton Bay, in the English Channel, to the northern, in Bridgewater Bay, in the Bristol Channel, which is shorter by fully 220 miles than going round the Land's End. The width is to be ninety-feet, with a depth of fifteen.

The Erewash Canal proceeds from the Cromford Canal, near Langley Bridge, to the Trent, near Sawley Ferry, being eleven miles and three quarters long, with a fall of 109 feet. The Nut-Brook Canal proceeds from the middle of this, and farther down it receives a branch of the Derby Canal, and near Sawley the Trent Canal.

The Exe River and Exeter Canal. The estuary of the Exe is navigable for eight miles, from Exeter up to the town of Topsham, and a little above this a canal proceeds from the river, running fully three miles up its west side. It is said that the first lock constructed in England was on this navigation, in 1675. But in 1829 an act was passed for making the canal enter the estuary at the Turf, two miles lower down, which will increase its length to five miles, with a depth of fifteen feet.

Forth River begins to be navigable at Stirling Bridge; but the tide reaches a little farther, to Craigforth Mill. From this downward the windings of the river are singularly intricate; its course to Alloa measuring more than three times the direct distance, which is only seven miles. On this account, although vessels of from sixty to seventy tons have water enough to Stirling, it is visited by few excepting steamers. About three miles above Alloa the Forth receives the river Devon, which is itself navigable for a short way, and very susceptible of great improvement. From this the Forth gradually expands into an estuary two miles wide opposite the mouth of the Carron, which is at the distance of thirty miles from Stirling by water. This estuary, called the Frith of Forth, continues eastward about forty-six miles farther to the Isle of May, where it may be reckoned to enter the German Sea.

The Forth and Clyde Canal commences in Grangemouth harbour, in the small river Carron, about two miles by the low-water channel, above its mouth in the estuary of the Forth. The general direction of this canal is that of west by south. It at first runs a considerable way on one level along the south side of the Carron, with which it again communicates by a cut from it at Bainsford, to that river at the Carron Iron-Works. The main line then passes to the north-west of Falkirk, and thence to Bonny Bridge, proceeding by the south side of Kilsyth, and along the south bank of the river Kelvin, and over the Logie Water by a stone aqueduct at Kirkintilloch. It then reaches Hamilton Hill about two miles from the north-west quarter of the city of Glasgow, to which there is a branch of two miles and three quarters, communicating with a branch from the Monkland Canal at Port-Dundas basin. The main line now proceeds westerly, crossing the Kelvin by a noble aqueduct, and then runs along the side of the Clyde, till it at length locks down to that fine river at Bowling Bay. The main line is thirty-five miles long, fifty-six feet wide at top, twenty-seven at bottom, and ten feet deep. In ten miles and three quarters from Grangemouth to the summit, it rises 156 feet by twenty locks. The summit-level continues about sixteen miles, and from it to the Clyde there is a descent of 156 feet by nineteen locks. Each lock is seventy-four feet long by twenty wide. At lock No. 16 from Grangemouth, this canal connects with the Edinburgh and Glasgow Union Canal.

Few canals have proved so lucrative as the Forth and

Clyde. Instead of having its eastern extremity in the Carron, it was originally intended to have had it considerably farther east, or lower down the Forth, in the deeper water at Borrowstownness. This would certainly have been an immense improvement, but probably not so easily executed as some imagine; for the work was really once considerably begun, and after all abandoned, chiefly, we presume, from the difficulty of passing over the river Avon, without raising the canal a good deal for several miles along the low carse lands. The remains of a bungled aqueduct bridge for this purpose were lately to be seen on the banks of that river.

The Foss Navigation, in the north riding of Yorkshire, follows the course of the river Foss from Stillington Mill, partly in that river and partly by canal, for about twelve miles and a half, to the Ouse, at York, descending forty-seven feet and two thirds.

Foss-dike Navigation commences in the Trent, at Torksey, continuing south-east on one level for eleven miles, through a flat country, to Brayford Mere, near Lincoln High Bridge, where it is joined by the river Witham; and about five miles west of Lincoln it receives the river Till. At Torksey is a double lock, with gates pointed both ways. This canal is supposed to have been first executed by the Romans.

Gippen or Gipping River has been made navigable from near Stowmarket for sixteen miles in a south-easterly direction, to where it falls into the tideway of the Orwell, on the south side of the town of Ipswich, near Stoke Bridge. From this the estuary of the Orwell extends about twelve miles to the sea at Landguard Fort.

Glamorganshire or Cardiff Canal commences about one mile and a half below Cardiff, on the east side of the river Taff, near its entrance into Penarth harbour. It runs north-west, parallel with the Taff, by the city of Landaff, crossing the Taff by an aqueduct bridge, and it is then joined by the Aberdare Canal. Still keeping up the vale, it reaches its termination at Merthyr Tydvil; the total length being about twenty-five miles, with a rise of 611 feet.

The Glasgow, Paisley, and Ardrossan Canal, though originally intended to connect these places, and to be thirty-two miles and three quarters long, has as yet only been executed for twelve miles. It begins at Port Eglinton, near Glasgow, proceeding westerly by the north bank of the White Cart River, along which it continues till near Paisley, where it crosses that river, and then passes on the south of that town to its termination at Johnstone. It is twenty-eight feet wide at top, fourteen at bottom, four and a half deep, and all on one level. The excavation of the rest of the canal seems to be quite laid aside; but the line is to be continued to Ardrossan by a railway now in the course of being constructed.

Glastonbury Navigation begins at the confluence of the rivers Brue and Parrett, in the Bristol Channel, running along the course of the Brue to Highbridge, and is to be continued by a canal, partly in that river, to the west side of the town of Glastonbury, in all fourteen miles and a quarter.

Glenkens Canal, on the Solway, though described in various books for the last thirty-five years, has never yet been executed.

The Gloucester and Berkeley Ship Canal begins in the Severn, at Sharpness Point, about three miles north of the town of Berkeley, proceeding by Slimbridge and Saul, and, crossing the Stroud Canal on the same level, it passes Wheatenhurst, Hardwick Court, and Hempstead House, and reaches the city of Gloucester, where it terminates in a spacious basin, out of which there is a lock into the Severn. The distance between Sharpness and Gloucester by the Severn is twenty-eight miles, whilst by the canal it is only sixteen and a half, and avoids a difficult and often

Navigation,
Inland.

Navigation,
Inland.

dangerous navigation. The width of this canal is seventy feet, depth eighteen, and it is level throughout.

The Grand Junction Canal proceeds from the Thames at Brentford, across the Brent rivulet, to the valley of the Colne, which it continues to follow past Uxbridge, Rickmansworth, Walford, King's Langley, Two-Waters, Berkhamstead, to the summit-level at Cowroast; being thirty-five miles and three eighths, with a rise of 395 feet, and through an almost continued series of mill pools. The summit-level extends only three miles and three fourths to Tring, and is chiefly in deep cutting. From Tring the canal continues by Marswath, near to Leighton Buzzard and Fenny Stratford, to the Ouse at Wolverston, near Stony Stratford, a distance of twenty-five miles and a quarter, with a descent of 192 feet. Here it crosses the Ouse on a small aqueduct, and an embankment half a mile long. Then running along the western side of, and having crossed the Five Rivers, the canal arrives at Stoke-Bruern, being a distance of six miles and a half, with a rise of 112 feet. It next goes through Blisworth tunnel, of 3080 yards, proceeding by Western Beck to the southern extremity of Whitton parish, being thirteen miles and a half, on one level. In three quarters of a mile from this to Whitton Mill it rises sixty feet, and then continues level for four miles and a quarter, to the farther extremity of Braunston tunnel, of 2045 yards. It is seven eighths of a mile, with a fall of thirty-seven feet, from this tunnel to the junction with the Oxford Canal. The total length of the main line of the Grand Junction between the limits now mentioned is ninety miles and a quarter. Its average width is forty-three feet, and depth from four and a half to five feet. The locks are eighty-two feet long by fourteen and a half wide. The Paddington branch, of thirteen miles and a half, is of the same dimensions. It connects with the main line about midway between Uxbridge and Brentford, and again with the Regent's Canal at Paddington. From Tring a level branch of six miles and three quarters reaches near Wendover; and, a little north of Tring, a branch of six miles goes to Aylesbury, falling ninety-five feet. From the embankment over the Ouse, a branch of nine miles and a half proceeds to the town of Buckingham; and another of nine miles from Gayton, by Old Stratford, to the Nen, near Northampton. By means of the Grand Junction a communication has been opened between London and the great manufacturing districts in the interior of the kingdom.

The Grand Surrey Canal commences at Wilkinson's Gun Wharf, on the south bank of the Thames, about a quarter of a mile east of the Thames Tunnel, and passing 1200 yards through the docks of this navigation, its course is southward, approaching at Bridge Place within 250 yards of the King's Dock Yard at Deptford, near to where it is joined by the Croydon Canal. It then turns west by Peckham New Town to the north side of Adlington Square, where it terminates. It is four miles and two chains in length.

Grand Trunk, see Trent and Mersey.

The Grand Union Canal unites with the Leicester Union Canal near Foxton, about four miles from Market Harborough, to which there is a branch. Its course is southerly, passing through a tunnel of 1166 yards at Bosworth, between Lutterworth and Northampton, and thence by Elkington and Guildsborough to Crick, at which there is a tunnel of 1524 yards. Then leaving Watford on the east, it continues to its termination in the Grand Junction Canal at Long Buckby. The entire length is about forty-five miles, with an ascent of seventy-six feet by ten locks, and a fall of fifty-four feet by seven locks.

Grantham Canal commences at the town of that name in Lincolnshire, passing Harloxton, Woolsthorp Point, Stainwith Close, Cropwell Butler, to its termination in the

river Trent, nearly opposite the mouth of the Nottingham Canal. The length is about thirty-three miles, with a fall of a hundred and forty-seven feet and a half. A branch of three miles and a half goes to the town of Bingham.

Gresley Canal forms a short connecting portion between or in the line of the Newcastle-under-Line Canal and the Newcastle-under-Line Junction Canal, the principal purposes of which are for conveying coals from the Apdale and Partridge Collieries on the west, and the Caldor line from the east.

The Hartlepool Ship Canal connects the Hartlepool harbour with the sea. It is 300 yards long, and nineteen feet deep, being cut through the solid rock.

Hereford and Gloucester Canal commences in the Severn opposite Gloucester, crosses Alney Isle and another branch of the Severn to Lassington, and terminates at Byster's Gate in Hereford. In eighteen miles from the Severn to Ledbury it rises 195½ feet, and then continues on the summit-level eight and a half miles to Monkhide, from which it descends thirty feet in three miles to Withington March, and thence to Hereford, six miles, it is level. The total length is thirty-five miles and a half, with three tunnels of 2192, 1320, and 440 yards respectively.

Hertford Union Canal is a cut of one mile in length, to connect the Hackney Cut of the River Lea Navigation at White-Post Bridge, near Temple Mills, with the Regent's Canal at Old Ford Lock, Bethnal Green. It is also called the Lea Union and Sir George Duckett's Canal.

The Horncastle Navigation commences in the Old Witham River, near Tattershall, Lincolnshire, and, partly occupying the bed of what was formerly the Tattershall Canal, proceeds to Horncastle by the course of the Bain River. It is about eleven miles long, and very little elevated above the sea.

Huddersfield Canal commences on the southern side of that town, running south-west by Slaithwaite, nearly parallel with a branch of the Colne, for seven miles and a half, which river it crosses three times by aqueducts; and, ascending 436 feet by forty-two locks, it attains, near Marsden, the highest summit-level in the island, being 656 feet above the sea, but only four miles long. This is principally occupied by the Standedge tunnel, of 5451 yards, which is upwards of three miles, being the largest in Britain, from which the canal emerges into the vale of Diggle in Saddleworth, to near Wrigley Mill. It then glides along the valley alternately on the north and south sides of the River Tame, past Dobcross, Scout, and Stayley Bridge, to its junction with the Manchester, Ashton, and Oldham Canal, near Duckinfield Bridge; having passed a farther distance of eight miles and a quarter, with a descent of 334½ feet by thirty-three locks. There is a tunnel at Scout of 240 yards, and another at Ashton of 198 yards. This canal forms part of the shortest water communication between the east and west coasts.

Hull River, see Driffield.

Itchin Navigation follows the course of the river Itchin from Blackbridge, near the city of Winchester, to the tideway at Northam, near the town of Southampton, a distance of fourteen miles.

Ivel River, which empties itself into the Ouse at Tempsford in Bedfordshire, has been made navigable for five miles and three fourths, up to Biggleswade; and it has long been proposed to extend it five miles and a quarter farther, up to Shefford.

Ivelchester and Langport Canal, in Somersetshire, is nearly seven miles long, running eastward from its commencement in the river Parrett, below the town of Langport, to Ivelchester or Ilchester.

Kennet and Avon Canal commences at the head of the navigable part of the river Kennet, at Newbury in Berk-

Navigation,
Inland.

Navigation,
Inland.

Navigation,
Inland.

shire, and passes up the valley of that river by Hungerford and Great Bedwin to Crofton, a distance of sixteen miles and a half, rising 210 feet by thirty-one locks. From this the summit-level continues two miles and a half, through a tunnel of 510 yards, to Brimslade. In one mile farther there is a descent of thirty-three feet by four locks to Wootton-Rivers, from which the canal continues fifteen miles along the vale of Pewsey, on one level, to Devizes; and in the next two miles and a half to Foxhanger it falls 239 feet by twenty-nine locks. Other four miles and a half, descending fifty-six feet by seven locks, bring it to Semington, where it is joined by the Wilts and Berks Canal. From this it passes five miles and a half to Bradford, and there descends ten feet by one lock into the vale of the Avon, along which it continues nine miles on one level to Sidney Gardens, Bath; and in about a mile farther it descends sixty-six feet and a half by seven locks into the Avon, near the Old Bridge. From this the Avon itself is navigable downwards by Bristol into the Severn. The entire length of the canal is fifty-seven miles; the breadth is forty-four feet at top, twenty-four at bottom; and the depth is from five to six feet. Few canals afford more specimens of deep cutting, aqueducts, and tunnels, than the Kennet and Avon. It completes a circuit of navigable canals, which, traversing the northern, midland, and southern counties of England, connect its four largest rivers, the Trent, the Mersey, the Severn, and the Thames. Thus, by uniting the rivers Kennet and Avon, the former of which runs into the Thames at Reading, and the latter into the Severn a few miles below Bristol, this canal becomes the central line of communication between the Irish and the German Seas.

Kennet River has been made navigable from where it falls into the Thames, about a mile and a half below Reading, up to its junction with the Kennet and Avon Canal at Newbury, in Berkshire, a distance of twenty miles. It ascends 126 feet, by twenty locks.

Kensington Canal, 3000 yards long, consists of Counters Creek, greatly enlarged and improved, its mouth being in the Thames, near Counters Bridge, on the road from London to Hammersmith.

Ketley Canal, see Shropshire.

Kingston Canal, see Leominster.

Lancaster Canal commences at Bark Hill, near Wigan, passing Chorley to Clayton Green, near the south bank of the river Ribble, a distance of thirteen miles and a half, which is level. From this across the valley of the Ribble to the top of its north bank the distance is four miles and a quarter, with a depression of 222 feet, which is passed by a railway and inclined plane on each side of the valley. From this railroad, past Garstang and Lancaster to Tewitfield, near Barwick, a distance of forty-two miles, the line of the canal is on one level, and is commonly called the Lancaster Level. In the next thirteen miles, to its termination at Kirkby-Kendal, it rises sixty-six feet. The general direction of this canal is north, and the entire length about seventy-three miles. It has a magnificent aqueduct over the river Lune, near Lancaster, being fifty-one feet above the river, and having five arches of seventy feet span each.

The Larke or Burn River, in Suffolk and Cambridge-shire, is navigable for fourteen miles, from Long Common, a little below Mildenhall Mill, to Eastgate Bridge, in Bury St Edmunds. Being connected with the Ouse, near Littleport, it is a very useful navigation.

Lea River Navigation commences at the town of Hertford, proceeding easterly by Ware to its junction with the Stort River Navigation, near Hoddesden, from which it veers south to Waltham Abbey, and preserves the same direction to Oil Mill, where, again bending south-east by Wanstead and Aldersbrook, it arrives at Temple Mills. A

little above this it is connected with the Regent's Canal by a cut of one mile, called the Hertford or Lea Union Canal. From Temple Mills the Lea proceeds to its descent into the Thames at Bow Creek. At Bromley there is a cut of one mile and a half, falling seventeen feet and a half into the Thames at Limehouse. The track of the Lea from the Hertford to the Thames is about twenty-six miles; and connected with it is the canal called the New River, which supplies London with water.

The Leeds and Liverpool Canal commences at Leeds Bridge, where it unites with the Aire and Calder Navigation, and terminates at North Lady's Walk, Liverpool, a distance of 127½ miles. In the course of forty-one miles from Leeds to the summit-level, near Greenberfield, the total rise is 411 feet; from the summit near Colne, to the basin at Liverpool, there is a fall of 433 feet; and from the basin to low water in the Mersey the fall is fifty-six feet. It is to be observed, that of this line of navigation eleven miles belong to the Lancaster Canal; that is, from Cophurst, or Johnson's Hillock, to Kirklees. The great tunnel of Foulridge is 1640 yards long, eighteen feet high, and seventeen wide. At Bingley, a connected series of five locks effect the enormous lift of eighty-eight feet and two thirds, which must often occasion a great waste of water, unless recourse be had to some additional artifice. This canal was forty-six years in hand, being begun in 1770, and finished in 1816.

The Leicester Navigation commences at the basin of the Loughborough Canal, and proceeds three miles to the separation of the Melton-Mowbray Navigation. (See Wreak and Eye Navigation.) From this the distance is eleven miles, with a rise of forty-five, to its termination in the Leicestershire and Northamptonshire Union Canal.

The Leicestershire and Northamptonshire Union Canal, commencing at the junction with the Leicester Navigation, proceeds partly in the bed of the river Soar, and partly by an artificial course, to the Grand Union Canal at Gumley Hall, a distance of seventeen miles, rising 160 feet. From the last place a branch of four miles goes to Market Harborough. There is a tunnel half a mile long at Saddington.

The Leominster Canal commences at Kington, 505½ feet above the sea, where it meets the Kington Railway; thence observing an easterly direction, it passes to the aqueduct over the Lugg at Kingsland, and then bends south to near Leominster. From this town it runs north for a considerable distance past Berrington House, then turns east with many windings past Tenbury to the aqueduct over the Rea, and the tunnel at Sousant, which is 1250 yards long. From the latter, which is 264½ feet above the sea, the canal runs eastward to its termination at Stourport, where it unites with the Severn and the Stafford and Worcester Canal, having described a track of forty-six miles. From Kington to Staunton Park it is level for four miles, then falls 152 feet in two miles and a half to Milton, thirty-seven feet in three miles and a half to Kingsland aqueduct, and sixty-four feet in four miles and a half to Leominster. In the next mile and a half it rises eighteen feet, and in five miles and a half farther to Wiston it is level; thence to Letwich Brook it falls thirty-six feet in four miles and a half. The next seven miles to Rea are level, then is a rise of thirty-five feet in one mile to Sousant tunnel, then nine level miles to Great Pensax tunnel of 3850 yards. But in the last three miles to the Stafford and Worcester Canal there is a fall of 207 feet; the total fall being 496 feet, and the rise forty-eight.

The Leven Canal is a cut of three miles from the village of Leven to the Driffeld or Hull River Navigation.

Lewes, see Ouse River, Sussex.

The Liskeard and Looe Canal commences at Tarras Pill, and runs northward to Moorswater, in the parish of Liskeard, in Cornwall. It is five miles and seven eighths long,

Navigation,
Inland.

rising 156 feet by twenty-five locks. It has a branch of one mile to Sand Place.

Louth Canal runs from that town northwards by Leatherville Mead and North Cockering to Titney, in the mouth of the Humber, a distance of fourteen miles, falling fifty-six feet and a half.

The Loyne or Lune River is navigable about seven miles in the tideway from Lancaster Bridge to its mouth in Lancaster Bay.

Lynn River, see Narr.

Macclesfield Canal commences near the north end of the summit-level of the Peak Forest Canal, and passes through a very undulating part of Cheshire to the road from Buxton to Congleton, where it locks down to its lowest level; then crossing the Dane, it runs south-west to its termination in the summit-level of the Trent and Mersey Canal, a distance of twenty-nine miles and a half, with a total fall of 113 $\frac{3}{4}$ feet. This, when executed, will shorten the communication between London and Manchester about thirteen miles.

Manchester, see Ashton.

The Manchester, Bolton, and Bury Canal ascends sixty-eight feet and one third, by six locks, from the Irwell to the basin in Salford; thence for four miles running parallel to the Irwell it is level, but in the next three miles it rises 121 feet by twelve locks. The remaining four miles to Bolton are level, and so is a branch of four miles to Bury.

Market Weighton Canal commences at New River Head, near Market Weighton, and runs almost directly south for eleven miles to its termination, with a sea-lock at Foss-dike Clough, in the Humber. Near the upper end are three locks.

The Medway River begins to be navigable for barges at Penhurst Bridge, about six miles above Tunbridge, and about forty-five miles by the crooked course of the river, from its mouth in the Thames at Sheerness; but some deduction should be made for several bends being now cut off. The tide formerly reached up to Maidstone, but has been obstructed by locks and weirs. Below Rochester Bridge this river is in many places of great width, and so deep as to float the largest vessels at low water, thus affording a safe and extensive harbour for Chatham dock-yard. A little below Rochester Bridge it is joined by the Thames and Medway Canal, and near its mouth by the East Swale or tide passage round the south side of the Isle of Sheppey.

The Mersey and Irwell Navigation commences in the estuary of the Mersey at Runcorn Gap, and terminates at the bridge between Manchester and Salford. It consists in these rivers improved by locks, weirs, and extensive side-cuts, so as to be conveniently navigable over a distance which by the course of the rivers exceeds fifty miles. The various canals connected with the Mersey and Irwell render this an undertaking of great utility.

The Monkland Canal begins at Old Monkland Colliery, and runs nearly direct west for twelve miles to Port Dundas at Glasgow, where it communicates with a branch of the Forth and Clyde Canal, to which it acts as a feeder. In its course it receives the Monkland and Kirkintilloch, Garnkirk and Glasgow, and Airdrie Railways. At Sheepford it falls twenty-three feet by two locks, and at Blackhill ninety-six feet by twelve locks. It is thirty-four feet wide at top, twenty-four at bottom, and four and a half deep.

Monmouthshire Canal commences in the Usk River, a little below Newport, close to the termination of the Rumney and Sirhowey Railways. Passing northward, this canal extends by Pontypool to Pontnewynydd, a distance of fully seventeen miles and three quarters. Near the latter place it connects with the Abergavenny and Brecknock Canal. In the last twelve miles it rises 447 feet; and, opposite Malpas, a branch of eleven miles, rising 358 feet,

goes to Crumlin Bridge. There are various extensive railway branches from this canal.

Montgomeryshire Canal commences at Portyway lime-works, where it joins a branch of the Ellesmere Canal; and having passed the village of Llany-mynach, and crossed the Verniew River, it joins another branch of the Ellesmere Canal. Next running to Gwern-felu, where a branch to Guilsfield turns off, it proceeds to Welchpool; after this it runs parallel to the Severn, which it at length joins on the east side of Newton. It is about twenty-seven miles long, running in a south-west direction, with a lockage of 225 feet.

Narr or Lynn River is navigable from the Ouse at King's Lynn to Castle Acre in Norfolk, a distance of about fifteen miles.

Neath Canal commences in the tideway of the Neath, at Giant's-grave-pill, in Briton's Ferry, and running north-west, terminates in the Aberdare Railway branch at Abernaut, a distance of fourteen miles. It has various other railway branches to the neighbouring collieries, &c.

Nen or Nyne River is navigable from the sea below Wisbeach, through the Fens to Peterborough, and from that by the natural channel, improved by cuts and locks, to Northampton, which forms a course of about ninety-nine miles. Beginning in the Wash at Peter's Point, and passing up nine miles to Wisbeach, the navigation may either be continued thence to Outwell by the course of the river, or by the still shorter track of the Wisbeach Canal, which also forms a communication between these places. But the navigation likewise proceeds from both places by two or three embanked courses through the Fens to Peterborough, a farther distance of forty miles; and thence by the original channel, greatly improved by cuts, weirs, and locks, for fifty miles more, up to the town of Northampton, to which a canal branch descends 112 feet from the Grand Junction Canal. Near Salter's Load the Nen communicates with the Ouse by means of Well Creek; and a still shorter navigation has been formed from Wisbeach to Lynn, through the Wisbeach Canal. The above may give some idea of the principal lines of navigation belonging to this river; but since most of the rivers and navigable drains in the fens are embanked on both sides, and since they are almost still water too, this occasions such a number of navigable branches intersecting and crossing in all directions, that a description of them would greatly exceed our limits.

The Newcastle-under-Line Canal extends about three miles westward, from the Trent and Mersey Canal at Stoke-upon-Trent to Newcastle, in the Newcastle-under-Line Junction Canal, which again continues the line north-west for eight miles farther (including in its middle the five miles of Gresley's Canal) to Partridge-Nest and Bignell-End Collieries.

The Newport Pagnell Canal is a branch of a mile and a quarter from that town to the Grand Junction Canal at Linford, with a rise of fifty feet by seven locks.

Nith or Nidd River Navigation commences in the Solway Frith, and extends nearly north for about nine miles in the tideway between the counties of Dumfries and Kirkcudbright, to Dumfries Bridge; but it stands much in need of improvement.

North Walsham and Dilham Canal commences at Wayford Bridge, in the parish of Dilham, Norfolk, in the river Ant, and runs north-west by North Walsham and Whitton Park, to its termination at Antingham, a distance of seven miles.

North Wilts Canal, see Wilts and Berks.

The Norwich and Lowestoff Navigation, commencing in the Wensum or Yare River at Norwich, follows partly the course of that river, and those of the Yare and Wensum, and proceeds partly through the Lake Lothing, and by

Navigation,
Inland.

Navigation,
Inland.

Navigation,
Inland.

cuts to Lowestoff, a distance of thirty miles. It traverses so flat a country, that a tide-lock only is necessary, which admits vessels eighty-four feet long, twenty-one wide, and drawing ten feet of water.

Nottingham Canal commences in the Trent, from which it has a winding course for about fifteen miles, with a rise of 108 feet to the junction of the Erewash and Cromford Canals at Langley Bridge.

Nutbrook or Shipley Canal is a branch extending four miles and a half, from the Erewash Canal, near Trowen, to the Shipley Collieries.

The Oakham Canal extends from that town to Melton-Mowbray on the Leicester and Melton-Mowbray Navigation; a distance of fifteen miles, falling 126 feet.

Ouse River, Sussex, navigable naturally nine miles in the tideway up the Lewes, has, by artificial means, been rendered navigable for twenty-two miles farther, up to Hammer Bridge.

Ouse River, Yorkshire, is navigable for vessels of 150 or 160 tons from where it receives the Trent, up to the junction of the Aire and Calder Navigation at Armyn, a distance of fifteen miles, and for smaller masted vessels twenty-five miles farther to the city of York. This river, notwithstanding its limited trade above that city, has such an immense traffic in the lower part, by reason of the numerous rivers and canals communicating with the manufacturing and mining districts, that it undoubtedly ranks the second river in the kingdom in importance and utility; whilst, by its union with the Humber, merchandise is exported to and imported from all parts of the globe.

Ouse River Navigation (Bedford Level) commences in the estuary of the Wash, below the town of Lynn, and proceeding thence by a cut of two miles and three quarters, called the Eau Brink, to Salter's Load and Denver's Sluice, it is thus far, which is about seventeen miles above Lynn, an open embanked navigation. From this upwards the natural river continues navigable still by an embanked crooked course through the Fens to Ely and Hermitage Sluice near Erith, and thence onward to Bedford, altogether about eighty-four miles from the sea. From Lynn the Narr or Lynn has been made navigable fifteen miles to Castle Acre in Norfolk; and from Salter's Load the Well Creek extends to the Nen and Wisbeach Navigation. Near Denver's Sluice the Ouse receives the river Stoke, also the Old and New Bedford Rivers, which are two parallel straight cuts of twenty-one miles, joining the Ouse again at Hermitage Sluice. From this last place a navigable cut of twelve miles conveys water from the Ouse to the Nen at Benwick. At Brandon Creek Bridge the Ouse receives the Little Ouse, which is navigable for twenty-two miles and a half south-east by Downham and Santon to Thetford; and at Prickwillow it receives the Larke, navigable to Bury St Edmund's. Near Barkway the Soham Lode, navigable for four miles to Soham, falls into the Ouse. At Harrimere it receives the Grant or Cam, navigable to Cambridge, and at Tempsford the Ivel. Almost the whole of the rivers and large drains connected with the Ouse are embanked and nearly level. Many others of them are navigable for short distances besides those we have noticed, but they are chiefly used for drainage.

The Oxford Canal commences in the Coventry Canal at Longford, proceeding thence twenty-six miles and a half on one level across the upper part of the valley of the Avon to near Hill Morton, where it rises nineteen feet by three locks. About eight miles farther on it is joined by the Grand Junction Canal; and in eight miles and three quarters more, at Napton, by the Warwick and Napton Canal. Thus far the course is very crooked. In the next two miles it rises fifty-five feet by nine locks to the summit-level, on which it continues ten miles and three quarters

(passing a tunnel of 1188 yards) to Claydon. From this the canal descends into the valley of the Charwell, proceeding seven miles and a quarter to Bambury, with a fall of seventy-seven feet by twelve locks. Following the Charwell, and crossing it near Hampton Gay, it passes to its termination in the Thames at Badcock's Garden on the west of the city of Oxford. The total length is about ninety-one miles; and in the last twenty-seven miles and a half from Banbury it falls 118 feet, by eighteen locks. It is twenty-eight feet wide at top, sixteen at bottom, and four and a half deep; but, to act partly as a reservoir, the summit-level is six feet deep. For various improvements and alterations on this navigation, we beg to refer to Priestley's Account of Canals, &c.

The Peak Forest Canal commences at Duckenfield, in the Manchester, Ashton-under-Lyne, and Oldham Canal, and passes south-east fifteen miles to Bugsworth, from which the line is continued seven miles by a railway to Limestone Rock, Peak Forest.

Penclawdd Canal extends eastward from the river Burry at Penclawdd, in Glamorganshire, for three miles and three fifths, to Kingsbridge; and, though short, it is said to be of great utility.

Pocklington Canal, Yorkshire, extends from East Cottingham, on the Derwent, to Street Bridge, Pocklington, a distance of eight miles and a half.

The Portsmouth and Arundel Canal commences in the tideway in the river Arun, at the village of Ford, three miles from the sea, at Arundel harbour, and proceeds westward close by Yapton, Barnham, and Merston, to half a mile from North Mundham, where the Chichester branch takes off. From this it passes by Donnington to Chichester harbour, where the principal line, which is almost twelve miles long from the Arun, terminates. The bed of the Arun is fifteen feet below high water spring tides; and there is a lock of five feet, above high-water mark, on the bank of the river. A little farther on is another lock of seven feet lift, from which the canal continues on the same level for ten miles five furlongs, to two locks, equal respectively to the two just mentioned, and similarly situated in respect of the other termination in the tideway. This canal is thirty-three feet wide at top, nineteen and a half at bottom, and four and a half deep. Both it and the Chichester branch, of a mile and a quarter, are fed by water raised by a steam-engine. The channel from the extremity of the main line of canal in Chichester harbour, round Thorney Island and Hayling Island, by Thorney and Langstone Wadeways, and Langstone harbour, to the end of the Portsea Canal, is thirteen miles and an eighth. The canal from Eastnay Lake is two miles and three eighths long; there are two locks at the east end, and a basin at the termination at Portsea. This part is five feet deep, and is fed by an engine. From the end of the main line in Chichester Harbour to the canal at Cosham, the distance is fifteen miles and a quarter; and the length of the canal to Porchester Lake in Portsmouth harbour is one mile and a quarter. This branch is seven feet deep, with a sea-lock of ten feet lift at each end. These important undertakings, from their connections with so many other navigations, will tend to open a ready inland communication between this quarter and almost every part of the kingdom, and may become serviceable for conveying military stores from London to Portsmouth in time of war.

Ramsden's (Sir John) Canal, is a short connecting link of three miles and three quarters, between the Huddersfield Canal at the King's Mill near Huddersfield, and the Calder and Hebble Navigation near Cooper's Bridge. It descends fifty-seven feet and a half, by nine locks.

Regent's Canal commences in the Paddington branch of the Grand Junction Canal, near the Harrow Road, and,

Navigation,
Inland.

proceeding in a north-east direction, passes through a short tunnel under the Edgeware Road, and thence runs parallel to Primrose Hill Road, till, having passed on the north of the Zoological Gardens, a branch of half a mile runs south-east to a basin at Cumberland Market. The main line preserves nearly its first direction, till, crossing the Pancras Vale Road, on the north of Camden Town, it turns more eastward; then locking down, it crosses Camden Road and the King's Road, and turns south-east across Maiden Lane, next to Horsfall's Basin, a quarter of a mile beyond which it enters the tunnel under Islington, 900 yards long, but which, most unfortunately, to save a trifle of expense, has no room for a towing-path. It next crosses the New River to Frog Lane, on the east of which is a lock, and also a branch called the basin, passing under the City Road. The main line continues eastward to Bridport Place, and, running parallel with Felton Street, it leaves a second basin on its north bank, and a little farther on a third basin on its south bank. From this it proceeds across Cambridge Heath Road, and then, bending greatly south, crosses Mile End Road, passes to Stepney Lane, crosses the Commercial Road, and finally arrives at the basin at Limehouse, by which it locks into the Thames, being a total distance of eight miles and a half, descending ninety feet by twelve locks besides the tide-lock. At Globe Town, a cut of one mile, running north-east, connects this canal with the River Lea Navigation. It is named the Hertford Union Canal, and sometimes the Lea Union.

Ribble River, Lancashire, has been rendered navigable for eleven miles westward from Penwortham Bridge, near Preston, to its mouth in the Irish Sea.

Rochdale Canal commences in the Bridgewater Canal at Castlefield, Manchester, and about a mile from this is joined by the Manchester, Ashton-under-Line, and Oldham Canal. It then passes the town of Rochdale, and along the north border of the high ground called Blackstone Edge, to its termination in the Calder Navigation at Sowerby Bridge Wharf, a distance of thirty-one miles and a half. The rise from Knott Mill, Manchester, to the summit, is $533\frac{2}{3}$ feet, and the fall from this to Sowerby Bridge is $353\frac{1}{2}$. This canal is one of the main links in the chain of inland navigation between the east and west seas.

The Rother River Navigation commences at Lower Platt, near Midhurst, Sussex, and passes by Cowley Park to Ambersham, and by Petworth and Burton to a little beyond Little Fittleworth, from which a cut passes to the river Arun, near Stopham Bridge, where the navigation terminates, the total length being eleven miles.

The Royal Military Canal commences in the tideway at Shorncliff in Kent, proceeding west to Hythe, and, gradually bending southward, passes on the south of Lympne and Appledore to the junction with the long proposed Weald of Kent Canal. From this it proceeds south to the river Rother, in the bed of which it continues past Rye to Winchelsea, where that river verges south-east, whilst the canal continues due south to Cliff End, and there terminates. The total length is about thirty miles, the width at top is from sixty-two to seventy-two feet, and at bottom from thirty to thirty-six, and the depth is nine feet. The locks are seventy-two feet long and sixteen wide; they are only required for the tide, and the fluctuations of the Rother.

St Columb Canal is a cut of six miles, from Maugan Porth to Lower St Columb Porth, in the county of Cornwall.

The Salisbury and Southampton Canal commences in the Itchin River at Norham, near Southampton, and runs along the north-east shore of Southampton Water to Redbridge, from which the line of navigation is continued north in the Andover Canal. From the latter, at Mitchel-

marsh, a branch was dug westward to Salisbury, but was abandoned because it would not hold in the water. This had not, it would seem, been thought worth a lining of clay, which, if properly executed, would make any canal hold in.

Sankey Brook Navigation, the first executed in England, originally commenced at Fidler's Ferry, at the mouth of Sankey Brook, from which it at first runs north, gradually bending west, and latterly turns south to St Hellens, where it terminates. The length is about twelve miles, rising seventy-eight feet by ten locks; width forty-eight feet at top, depth five and a half. In 1830 an act was obtained for extending this navigation three miles and a quarter, from a little above Fidler's Ferry to Widness Wharf, West Bank, near Runcorn Gap.

The Severn River is navigable for 178 miles, with a descent of 225 feet, from Welshpool, through the counties of Montgomery, Salop, Worcester, and Gloucester, till it enters the Bristol Channel. Its navigable connections are the Montgomeryshire Canal at Newtown; the Shrewsbury Canal at Shrewsbury; the Shropshire Canal at the Hay; the Staffordshire and Worcestershire Canal, and the Leominster Canal, at Stourport; the Droitwich Canal at Hawford; the Birmingham and Worcester Canal at Diglis, below Worcester; the river Avon at Tewkesbury; the Coombe Hill Canal at Fletcher's Leap; the Hereford and Gloucester Canal at Gloucester; the Gloucester and Berkeley Canal, both at Gloucester and at Sharpness Point; the Stroud Canal at Framiload; the Lydney Canal below Lydney; the river Wye at Beachley; the Bristol River Avon at Morgan's Pill; and the Monmouthshire Canal at Newport.

Sheffield Canal connects that town with the river Dun Navigation in the township of Tinsley. It is little more than four miles long, with a fall of seventy feet by eleven locks.

The Shrewsbury Canal commences at Rockwardine Wood, in the north extremity of the Shropshire Canal. The first mile is level. At Woombridge it descends seventy-five feet by an inclined plane; and in the next four and three quarters miles to Langdon is a farther fall of seventy-nine feet by locks. It then crosses the river Tern by the first iron aqueduct used in a navigable canal, and, proceeding by Roddington, it passes a tunnel of 970 yards, and at length runs along the bank of the Severn to its termination at Shrewsbury. The total length is about seventeen miles and a half.

Shropshire Canal commences at the Donnington Wood Canal, and passing Rockwardine Wood and Madeley, proceeds to its termination in the Severn at Coalport, two miles below Coalbrook Dale. The length is seven miles and a half. It has a rise of 120 feet, and two falls of 126 and 207 feet, all of them by inclined planes.

Sleaford Navigation extends from Chapel Hill, on the Old Witham River, to the Castle Causeway near Sleaford. It is about thirteen miles and a half long, thirty feet wide at top, eighteen at bottom, and five feet deep. The greater part of its course is embanked through the fens.

Soar River Navigation consists of the river Soar, made navigable for seven miles up from the Trent, and of a cut of one mile and a half, which continues it to Loughborough, where it connects with the Leicester Navigation.

Somersetshire Coal Canal commences at the Kennet and Avon Canal at Limpley Stoke, and terminates at Paulton, a distance of ten miles. It is connected with various collieries by railways.

Staffordshire and Worcestershire Canal commences in the Severn at Stourport, and proceeds northerly by Milton, Kidderminster, Tittenhall, Penkridge, and Baswich, to its termination in the Trent and Mersey Canal near Haywood, Staffordshire. The total length is forty-six miles

Navigation,
Inland.

Navigation,
Inland.

and a half. In the first twelve miles and a quarter from Stourport, to where it is joined by the Stourbridge Canal, it rises 127½ feet by thirteen locks; in the next eleven miles it rises 166½ feet by eighteen locks. The next ten miles, in which it is joined by the Old Birmingham Canal, are level; and in the remainder it falls 100½ feet by thirteen locks. This canal is thirty feet wide at top, and five deep. The locks are seventy-four feet long, and seven feet wide, but had originally only four feet water on the sills.

Stainforth and Keadby Canal begins in the river Dun, near Stamford, Yorkshire, and passes eastward fifteen miles to the Trent at Keadby, Lincolnshire, where it has a tide-lock. There is only another lock near Thorne, of five feet lift, the tract is so flat.

Stort River has been made navigable for ten miles in Hertfordshire and Essex, from the New Bridge, Bishop-Stortford, to the river Lea at Rye near Hoddesden.

Stourbridge Canal extends about five miles from the Stafford and Worcester Canal at Stewponcy, near Stourton, to the Dudley Canal at Black-Delph, from which a branch of one mile goes to Stourbridge, and another of two miles to Pensnet Chase Reservoir. It rises 191½ feet by twenty locks.

Stour River, between Suffolk and Essex, has been rendered navigable for nineteen miles from Sudbury to Manningtree; thence to Harwich it is a wide estuary.

Stratford-upon-Avon Canal commences at King's Norton, about six miles from Birmingham, and proceeds south-eastward by Lapworth and Preston Mill to Stratford, a distance of twenty-three miles and a half, descending 309 feet. From near Hockley, a branch of two miles and a half goes to Tamworth quarries; from Lapworth another of one mile and three quarters to the Warwick and Birmingham Canal; from Wilmote another of four miles to Temple Grafton Limeworks; and from this branch a cut of one mile to Aston Cantlow.

Stroudwater Navigation commences at Framiload, running eastward across the Gloucester and Berkeley Canal, and the Stroudwater, to Wallbridge, near Stroud, in the Thames and Severn Canal, a distance of eight miles, rising 102½ feet.

Swale River, see Ouse.

Swansea Canal commences in Swansea harbour, and running north-eastward by Llandovery, and across the small river Twrch, terminates at Pen Tawe, a distance of seventeen miles, rising 373 feet.

Tamar Manure Navigation. The river Tamar has been made navigable from Morwelham Quay (where Tavistock Canal begins) up to Boat Pool, whence a canal has been continued north-west for about twenty-two miles to Tadmerton Bridge. From near Poulson Bridge a branch goes off to Launceton.

Tavistock Canal extends from the tideway in the Tamar four and a half miles north-east to Tavistock, with a rise of 237 feet. From Crebar a branch of two miles goes to the slate quarries at Millhill Bridge, rising nineteen feet and a half.

Tay River is navigable from the city of Perth, gradually widening downwards by Dundee to the German Sea, a distance of twenty-eight miles, through which the tide flows; but it only admits of large vessels reaching Perth at stream tides. It was formerly much obstructed by floods at one season, and shallows at another; but in 1830 an act was obtained for its improvement.

The Tees Navigation commences in that river at Stockton, and proceeds chiefly by an artificial course to Portrack,

and thence by the estuary of the Tees Mouth to the German Sea; the total distance is about twelve miles, and level in the tideway.

Thames River having a separate article devoted to it, we shall only here treat very briefly of its navigation and navigable connections. The principal branch of this noble river, under the name of the Isis, and greatly improved by artificial means, begins to be navigable at Lechlade, about 146½ miles above London Bridge by the course of the river, and where the Thames and Severn Canal locks into it. At Oxford it receives the Oxford Canal; at Abingdon, the Wilts and Berks Canal; near Dorchester, its other branch the Thame; at Caversham Bridge, near Reading, the Kennet Navigation; near Woburn Park and Ham, the river Wey, with the Basingstoke Canal; near Brentford, the Grand Junction Canal; a little below Wandsworth, the Kensington Canal. Pursuing its course through London, it comes to the St Katherine's Docks, and then to the London Docks, a little below which it is passed underneath by a tunnel. It is next joined on the south by the Grand Surrey Canal, and then at Limehouse on the north by the Regent's Canal, and the Limehouse Cut to the river Lea. Proceeding a little, it reaches the western entrance to the West India Docks at the Isle of Dogs, round which it makes a more than semicircular bend; first south to Deptford and Greenwich, and then north again to the eastern or Blackwall entrance to the West India Docks. To avoid or shorten this route, a cut, called the City Canal, was made by government across the isthmus, and after all cutting off little more than half the bend; but so few inclined to avail themselves of such a partial improvement, that this canal was quite neglected, and was latterly sold to the West India Dock Company, who now use it for the wood trade, under the name of South Dock. But before reaching Deptford, the Thames had on its western bank passed the Commercial Docks. At Blackwall it passes the East India Docks, and, at Bow Creek receiving the river Lea, pursues its way to Woolwich, where a short canal is cut to the Arsenal, a little below which it receives the river Roding on the north, and, nearly opposite Purfleet, the river Darent on the south. At Gravesend, the Thames and Medway Canal unites with it; at Sheerness on the south it receives the river Medway, and has now itself become a large estuary, five miles wide, called the Mouth of the Thames, which, expanding greatly, receives from the north and west the rivers Crouch, Blackwater, and Colne.

Owing to the natural obstructions which exist in many parts of the river, from bends, shoals, islands, weeds, &c. the velocity of the Thames does not follow the law of the variation of the inclinations; and the artificial obstacles from weirs, pound-locks, fishing-ayes, &c. render it impossible to ascertain the velocity correctly. Much depends also on the volume of water which may be passing down the river at the time, and the use of *flashes*.¹ The total fall from Lechlade to low-water mark at London Bridge, a distance of 146½ miles, is 258 feet; being on an average about twenty-one inches per mile. This is overcome by several locks, constructed at different periods, of which the lowest, at Teddington, eighteen miles and three quarters above London Bridge, forms the limit of the tide. In general the velocity may be estimated at from half a mile to two miles and three quarters per hour; but the mean may be about two miles. Between London Bridge and Westminster Bridge the mean velocity of the flood tide is now three miles per hour, maximum three and a half; and the mean ebb three miles and one sixth, maximum three and

Navigation,
Inland.

¹ A flash is water suddenly let out to increase the depth over a shallow while a boat is passing. It also helps to scour and deepen the channel.

Navigation,
Inland.

three quarters. Formerly they were much less. The fall from Teddington Lock to London Bridge is only sixteen feet and three quarters, or ten inches and three quarters, per mile; for in general the fall gradually diminishes from Lechlade downwards.

The removal of the numerous and bulky piers of the Old London Bridge has wrought an important change in the Thames, not only above or west of the bridge, but likewise, though in a smaller degree, below or east of it. The very contracted spaces through which the water had formerly to force its way occasioned frequently a fall of five feet at low water, instead of which there is now only a fall of about two inches at the new bridge; so that the low-water line above the bridge is nearly five feet lower at spring tides than formerly. In consequence of this, a greatly increased body of tidal water now flows up and down the river, and with a decidedly greater velocity than formerly. The effect of this is to scour and deepen the bed of the river; its influence in this respect being already sensibly felt as far up as Putney Bridge, seven miles and a half above London Bridge. The shores above the latter, that were formerly foul and muddy, are now becoming clean shingle and gravel; and near low water the beach is quite hard and firm. East of London Bridge the shoals are also deepening; and there can be little doubt that the change will at no distant period be felt from the Nore up to Teddington. The depression of low water below the bridge has been so considerable as to cause ships in many instances to ground in their tiers. From a register of the tides, it appears that the average depth at low water on the sill at Shadwell Dock is twenty-two inches below the old mark called Trinity Datum; and where formerly there were eight feet upon the dock sill there are now only six feet two inches on the average. Before the removal of the old bridge, a barge starting from the Pool at Rotherhithe with the first of the flood, could not get farther than Putney Bridge without the assistance of oars or horses. But, under similar circumstances, a barge now reaches Mortlake, four miles farther up, before using oars; and with a little help she may reach Richmond, and, taking horses there, get to Teddington in a tide. The descent down the river has been equally facilitated.

The immense trade of the navigable part of this river arises principally from its having London on its banks, and bearing to and from it numberless ships, fraught with the produce of every country and every climate. Its depth of water is so great, that even at ebb tide it is from twelve to thirteen feet in the fair way of the river above Greenwich. The mean range of the tides at London Bridge is about seventeen feet, whilst at extreme springs it is about twenty-two. Up to Deptford, the river is navigable for ships of any burthen; to Blackwall, for those of 1400 tons; and to the St Katherine's Docks, adjoining the Tower, for vessels of 800 tons.

The Thames and Medway Canal is a cut of about seven miles and a half through the isthmus, or rib of land, between these rivers, and was constructed for the purpose of shortening by forty miles (some say forty-seven) the water communication between Gravesend and Chatham, or Rochester, which had hitherto been by the Nore. It commences in the south bank of the Thames, at Gravesend, nearly opposite Tilbury Fort, where it has a great tide-lock, and a basin and wharfs. From this it runs eastward for about three miles through Gravesend Marshes; then, after turning considerably to the south, it passes through a tunnel of two miles and a half, and proceeds to join the river Medway, where it has another tide-lock and basin nearly opposite to Chatham. The water in this canal is fifty feet wide at top, twenty-eight at bottom, and eight feet deep. The hill through which the tunnel is carried is in some places of such a loose texture that several of the work-

men were killed by the unexpected shooting in of the chalk and flints upon them. They had not, it seems, used any precaution to prevent such an occurrence, or to avoid the danger of it. This tunnel, being of large dimensions, and provided with an excellent towing path, has greatly the advantage of many of the miserably confined holes which are carried through hills in other parts of the kingdom. The breadth of the water through the tunnel is twenty-two feet; but a particular description of the locks will be found farther on.

The Thames and Severn Canal commences at the extremity of the Thames and Isis Navigation, near Lechlade, and proceeds by Kempsford and Cricklade to Latton, where it is joined by the Wilts and Berks Canal; thence it passes to Siddington St Mary, at which a branch of a mile goes to Cirencester; continuing westward, it passes through the famous Sapperton tunnel, 4300 yards long, and 250 feet under the top of the hill. From this, it passes to its termination in the Stroudwater Canal, at Wallbridge, near Stroud. The total length is thirty miles and one eighth, viz. from Lechlade to the tunnel twenty miles and three eighths, rising 134 feet by fourteen locks; the tunnel or summit-level two miles and three eighths, and from it to the termination seven miles and three eighths, falling 243 feet by twenty-eight locks. This canal is forty-two feet wide at top, twenty-eight at bottom, and five deep. The locks are eighty feet long and twelve wide.

The Tone and Parrett Navigation commences in the line of the proposed Grand Western Canal at Taunton, and runs nearly north by a bending course, passing Bridgewater, to Start Point, in the Bristol Channel; being, however, joined in its course at Borough Chapel by the Parrett River. The length is about twenty-seven miles.

Trent River begins to be navigable at Burton-upon-Trent, where it is joined by a branch from the Grand Trunk, and which is about 117 miles from the Humber. It proceeds in a north-easterly direction to near Swarkestone, where it receives the Derby Canal, and then at Wilden Ferry it is joined by the Grand Trunk or Trent and Mersey Canal; next by the river Soar or Loughborough Navigation, and opposite to it by the Erewash Canal; then passing Clifton Hall, where the Beeston Cut, which connects with the Nottingham Canal, joins it on the north, it runs down to Nottingham, and there joins the Grantham Canal. Next at Torksey it connects with the Foss-dike Navigation, and at West Stockwith with the Chesterfield Canal and the river Idle. At Keadby it connects with the Stainforth and Keadby Canal, and joining the river Ouse at Trentfalls, their united waters form the Humber. The total descent in the 117 miles is about 118 feet. This river, connecting the port of Hull with a wide extent of country, by numerous rivers and canals, forms a ready medium of traffic for the several very extensive manufacturing and agricultural districts with which it communicates.

The Trent and Mersey Canal, sometimes called the Grand Trunk, from its passing through the central parts of the kingdom and connecting the Trent, Mersey, and Severn, commences at Wilden Ferry, where the Derwent falls into the Trent, and running south-west, passes Aston and Swarkestone, near where it is crossed by the Derby Canal; thence continuing to Burton, where it communicates with the Trent, it passes on to Tradley, and there joins the Coventry and Fazeley Canal. Turning north-west by Rugeley to Heywood Mill, it is there joined by the Staffordshire and Worcestershire Canal. Passing by Weston to Stone, and north by Trentham to Stoke, it is there joined by the Newcastle-under-Line Canal on the south; and the Caldon branch runs from its north side to near Uttoxeter. Continuing north by Etruria, it passes through the new tunnel of 2880 yards at Harecastle, in Staffordshire, which was made only

Navigation,
Inland.

Navigation,
Inland.

Navigation,
Inland.

about a dozen years ago, the original tunnel being excessively confined, and without a towing-path. This canal is then joined by the Macclesfield Canal. It next inclines north-west to Middlewich, where the Middlewich branch goes off; then passes near Northwich, and through the three small tunnels of Barnton, Saltersford, and Preston, to its termination at Preston Brook, in the Duke of Bridgewater's Canal. From Wilden Ferry on the Trent, to the Harecastle summit, there is a rise of 316 feet; and from this to Middlewich the fall is 326 feet; the remainder being level to Preston Brook. The total length is about ninety-three miles.

Tyne River is navigable for large vessels in the tide-way for fifteen miles up from its mouth, in the German Sea, to Newcastle, and a few miles farther for a particular kind of barges called *keels*. The principal trade is in coals, and has for ages been carried on to a great extent.

Ulverstone Ship Canal commences at Hammerside, in Morecombe Bay, in the Irish Sea, and terminates at the new basin and wharfs at Ulverstone; it is about a mile and a half long. The water is sixty-five feet wide at top, thirty at bottom, and fifteen feet deep. It has a tide-lock 112 feet long at its entrance.

Ure River Navigation, or Ripon Canal, proceeds partly up the Ure, from its mouth at Milby, on the Ouse or Yore River, and partly by a canal to Ripon. The length is about eight miles and a half.

The Warwick and Birmingham Canal commences in the Warwick and Napton Canal at Saltesford, in the borough of Warwick, and passing north-west by Bowington to Kingswood, is there joined by the Lapworth branch of the Stratford-upon-Avon Canal; thence, by Knowle, Olton End, and Kingsford, it at length joins the Digbeth branch of the Birmingham Canal at Birmingham. The first half mile is level; the next two and a half to Hatton rise 146 feet by twenty locks; and thence there is a level of eight miles and a half to Knowle Common. Having in the next quarter of a mile risen forty-two feet by seven locks, it then runs ten miles level, and the remainder falls forty-two feet by five locks. The total length is twenty-two miles and a half.

Warwick and Napton Canal extends from the Warwick and Birmingham Canal at Saltesford to the Oxford Canal, near Napton-on-the-Hill, a distance of about fourteen miles, with a rise of 134 feet.

Waveney River, between Suffolk and Norfolk, is navigable for about twenty-three miles from its mouth in the Yore, at Burgh, up to Bungay.

Wear River is navigable from its mouth in the German Sea, at Sunderland, up to near the city of Durham; a distance of about eighteen miles. This navigation is of great importance for the exportation of coal, which abounds in the neighbourhood; and in 1830 an act was obtained for various improvements on it.

Weaver River Navigation commences in the tideway of the Mersey at Weston Point, and proceeds first in a cut for four miles, and then nearly up the course of the river to Winsford Bridge; a total distance of twenty-three miles and three quarters, ascending fifty feet by twelve locks.

Welland River has, by means of locks, weirs, and cuts, been made navigable from its mouth in the Wash, up to Stamford, in Lincolnshire; but the works require to be greatly improved.

Wey River has been rendered navigable from its mouth in the Thames, partly by extensive side-cuts, and partly in the bed of the river, up by Woburn Park and Guildford to Godalming. In fifteen miles and a quarter from the Thames to Guildford it rises sixty-eight feet and a half; and thence to Godalming, which is mostly an artificial canal, the rise is thirty-two feet and a half. The total length is about twenty miles and a half. About two miles from

the Thames it is joined by the Basingstoke Canal, and farther on by the following.

The Wey and Arun Junction Canal extends from the Wey, near Shalford Powder Mills, to the Arun Navigation at Newbridge; a distance of eighteen miles. It forms part of the navigable line between London and Portsmouth.

The Wilts and Berks Canal commences at Semington, in the Kennet and Avon Canal, and proceeds by near Melksham, Chippenham, Wootton-Basset, and Wantage, to the Thames at Abingdon; a distance of fifty-two miles. From Derry Hill a branch of one mile and a half goes off to Chippenham; and near Stanley House another of three miles goes to Calne. From near Eastcott a branch of eight miles and a half, originally called the North Wilts Canal, goes to join the Thames and Severn Canal, near Cricklade, with a fall of fifty-eight feet and two thirds; and from Breach Field a branch of three quarters of a mile goes to Wantage. In the first seven miles and three eighths to the Chippenham branch the rise is fifty-four feet; thence to the Calne branch, one mile and a half, rising seventeen feet; and thence to the summit-level, ten miles and three quarters, rising 130 feet. The summit extends nine miles and three eighths, and in fifteen miles from it to Wantage River the fall is seventy-one feet and a half; thence to Abingdon, seven miles and three quarters, the fall is ninety-six feet and a half. This canal is an important link in several navigations.

The Wisbeach Canal is a level cut of six miles, from the Nen River at Wisbeach, to the Old River at Outwell, at the end of Well Creek, through which it communicates with the Ouse at Salter's Load Sluice.

Witham River is navigable from its mouth in the Wash, up to the Foss-dike Navigation, at the city of Lincoln; a distance of thirty-eight miles, through a level country, viz. from the sea to Boston five miles, thence to the Sleaford Canal eleven miles, thence to the Horncastle Navigation three miles, and thence to Lincoln nineteen miles. The greater part is embanked on both sides from the sea upwards.

The Worcester and Birmingham Canal commences at the junction of the Birmingham Canal and the Birmingham and Fazeley Canal, at the upper end of the town of Birmingham, and runs south-west to its junction with the Dudley Canal at Selly Oak; thence south-east to King's Norton, where it receives the Stratford-upon-Avon Canal. From this it continues south-west by Stoke Prior, till a little east of Droitwich, it joins the Severn at Diglis, a little below Worcester. The total length is twenty-nine miles, the breadth at top forty-two feet, and the depth six. In the first fourteen miles the canal is level; but in the remaining fifteen it falls 428 feet by seventy-one locks, which are each eighty-one feet long and fifteen wide. There are five tunnels on this line; that at West Heath is 2700 yards long.

Wreak and Eye Rivers, or Leicester and Melton-Mowbray Navigation, extends from the Leicester Navigation at Turnwater Meadow to the Oakham Canal at Melton-Mowbray, about eleven miles. It follows the courses of the Wreak and Eye.

Wye and Lugg Rivers, the former the principal branch, begins to be navigable ninety-nine miles and a half by water from the Severn, viz. from Hay to Hereford thirty miles, thence to the mouth of the Lugg seven and a half, thence to the town of Ross twenty-one and a half, thence to Lidbrook eight, thence to Monmouth twelve, and thence to the Severn twenty and a half. This river has a considerable declivity; and the great rise of the tides renders the lower part difficult and dangerous.

Wyrley and Essington Canal commences near Wolverhampton, in the Birmingham Canal, and passes by Polsal and Lichfield to the Coventry Canal near Huddlesford, a distance of twenty-four miles. The first sixteen to Can-

Navigation,
Inland.

nock Heath Reservoir are level; in the remaining eight is a fall of 270 feet by thirty locks. There is a branch of five miles and a half to Hay-Head Lime-works; another of two miles and a half to Lords-Hay Collieries; another of four miles to Wyrley-Bank Collieries, with a cut of one mile from it to Essington New Collieries. The canal is twenty-eight feet wide at top, sixteen at bottom, and four and a half deep.

Yare River is navigable from Norwich to Yarmouth by a crooked course of twenty-eight miles. At Yarmouth it is joined by the river Thyrn, and at Burgh by the Waveney. This navigation being incommoded by shallows, gave rise to the Norwich and Lowestoff Navigation.

Yore River, see Ure.

Several of the British canals always were, and others are now become, very unproductive. Some have suffered from an ill-advised location, and others have been reduced in value by changes in the course of trade. The rapid progress of manufactures, and the increase of domestic commerce, have invited a resort to new and shorter channels of communication; and not a few costly works are now sustaining an unequal competition with the less expensive productions of more modern art. The day may not be very distant when these will in their turn become unprofitable, and give place to other projects; but they can never cease to be regarded as monuments of skill in mechanical construction. Some of the canals of England are sadly cramped, by the miserably confined state of their bridges, and especially of their tunnels, which are often so low and narrow as to have neither room for a towing-path, nor yet for the boatmen, except lying prostrate, and moving the boat slowly along, by pawing against the walls with their hands or feet. Some excuse might be pleaded for those of this sort which were first made, or which are in obscure districts; but it is remarkable that the tunnel of the Regent's Canal, which passes under a wing of the great metropolis, and was only made in 1819, should have no towing-path.

Ireland.

It has been said that the unfortunate Earl of Strafford, from having seen the utility of inland navigation in the Low Countries, first suggested the improvement of river navigation in Ireland. In 1703 the first act of parliament was passed for rendering the Shannon navigable, and many improvements were projected. Nothing, however, was effected but an useless expenditure of L.140,000 on the Shannon and Boyne in the year 1758. Various other large sums were afterwards granted and frittered away in partial improvements of the Shannon, Boyne, Barrow, and Newry Rivers, besides the Grand, Royal, Kildare, Naas, and Lough Earne Navigations.

The following is a concise account of the principal inland navigations of Ireland, arranged alphabetically; but several others are in progress.

Bandon River, county Cork, is navigable from the port of Kinsale up to within two miles of Bandon.

Bann River, county Down, is navigable for nine miles, from where it is joined by the Newry Canal, near Portadown, to its entrance into Lough Neagh. This is sometimes called the Upper Bann. The outlet of Lough Neagh, called the Lower Bann, is not navigable, but might surely be easily made so, since it has only a descent of thirty-eight feet to the sea, five miles below Coleraine.

Barrow River has been rendered navigable from the tideway below St Mallins, up to where it is joined by the Grand Canal at Athy Bridge, a distance of forty-three miles, falling 172 feet. But from Athy to the mouth of the Barrow, in the estuary of Waterford harbour, and through that to St George's Channel, the distance exceeds sixty miles.

Blackwater River, county Cork, is navigable from its mouth at Youghall, up as far as the tide reaches, or at most to Cappoquin. There is another and smaller Blackwater, connected with the Tyrone Canal, and flowing into Lough Neagh.

Boyne River is navigable from the bay of Drogheda for twenty-two miles up to Trim, in the last seven miles of which it ascends from Navan 189 feet, by means of locks, which are from eighty to 100 feet long, and fifteen wide.

Corrib River and Lough or Lake form a navigable line, commencing at the mouth of that river in Galway Bay, and extending from Galway town in a north-westerly direction for about twenty-four miles.

Earne River and Lough or Lake are navigable through the lake, from the upper part, where the river enters it, below Belturbet, till it leaves it again at Enniskillen, where it is obstructed by weirs; but below the isle on which that town is built the river again expands into the lower part of the lake, through which it is also navigable. Thus far the entire distance is about thirty miles, and the navigation is terminated by a fall, from which the river has a rapid course of nine miles to Donegal Bay. It has been proposed to construct a canal from Lough Earne, beginning near Belturbet, and to follow along the valleys of the Finn and Blackwater to Lough Neagh.

Fergus River, county Clare, is navigable from its mouth, in the Shannon, up to Ennis, the county town.

Foyle River is navigable for ten miles from its mouth, in the estuary of Lough Foyle, below Londonderry, up to Strabane.

The Grand Canal commences on the south side of the river Liffey, near its mouth, and proceeds westward by the south side of the city of Dublin, through the counties of Dublin, Kildare, and King's County to the Shannon, with which it unites near Banagher. But, exclusive of this main line of about eighty-seven miles, there is a westerly branch or rather continuation of the line for fourteen miles beyond the Shannon to Ballinasloe, and there is a southerly branch of twenty-six miles from Lawton to Athy, where it joins the Barrow. There are also branches to Naas, Mount Mellick, Portarlinton, and other places. The water is forty feet wide at the surface, twenty-five at the bottom, and six deep. The locks on the main line are seventy feet long, fourteen and a half wide, with five feet of water on the sill, and their average lift is nine feet. The track of this canal passing for a considerable way through the bog of Allen added greatly to the expense, which is said to have exceeded two millions sterling. The highest part rises 278 feet above the sea.

Lagan Navigation commences in the tideway at Belfast, and proceeds mostly by the course of the river as far as Lisburn, from which it is continued by a canal, by Hillsborough and Moira, to Lough Neagh. The total length is twenty-eight miles.

Lee River is navigable in the tideway up to the city of Cork, and for small craft somewhat farther. Below Cork, however, the navigation is principally an arm of the sea called Cork harbour.

Liffey River is navigable from its mouth in Dublin Bay for about three miles up to Carlisle Bridge, at the farther end of the city of Dublin. From the south side of this navigable part proceeds the Grand Canal, and from the north side the Royal Canal.

Limerick Navigation commences at that city, and proceeds in a north-easterly direction, partly in the Shannon and partly by canals, for fifteen miles, to Killaloe, at the south end of Lough Derg.

Maig River, county Limerick, is navigable from its mouth in the Shannon to near Adare.

Moy River, county Mayo, is navigable for about five miles, from Killala Bay up to Ballina.

Navigation,
Inland.

Navigation,
Inland.

Neagh Lough or Lake, being about twenty miles long and ten broad, is generally of sufficient depth to be navigable to a considerable extent in every direction. It communicates with Belfast by the Lagan Navigation, with the Tyrone Collieries by the Blackwater, with Antrim by the Antrim River, and southward with the sea by the Newry Navigation.

Newry Navigation commences in the tideway of Lough Fathom, three miles below Newry, which it passes, and proceeds sixteen miles by a canal to the upper Bann River, in which it continues to Lough Neagh. The entire length is about thirty miles and three eighths, generally in a north direction. It has hitherto been a very imperfect navigation, but was the first executed in Ireland.

Nore River is navigable from its mouth, in the Barrow, two miles above New Ross, for considerable vessels to Inistioge, and up to Thomastown for barges.

The Royal Canal commences at Dublin, on the north side of the Liffey, and proceeds in a direction which generally diverges slightly from that of the Grand Canal, being about west by north for eighty-three miles to its junction with the Shannon at Tarmonbury. The water is forty-four feet wide at top, twenty-four at bottom, and six deep, and the summit is 322 feet above the sea. The locks are eighty-one feet long and fourteen wide. A few years ago this canal was said to be in a sadly neglected state; part of it at Leikslip, eight miles only from Dublin, having scarcely ever been used, and the works apparently fast going to ruin.¹

Shannon River forms the most important feature in the inland navigation of Ireland. For the first 144 miles of this navigation, viz. from the head of Lough Allen to the sea below Limerick, the Shannon may be considered as a concatenation of rivers and lakes. Issuing from Lough Allen, it passes Leitrim, Carrick, Tarmonbury, &c., and then enters, at Lanesborough, a very irregularly shaped and extensive sheet of water, called Lough Ree, about seventeen miles in length. Leaving it, the river, now greatly augmented, passes Athlone, and then winds by Shannon Bridge and Banagher to Portumna, near which it expands into Lough Derg, another narrow lake, twenty-three miles long, with deep bays and inlets. From the southern extremity of this lake it flows on to Limerick. In this extent of navigation we have, first, Lough Allen, ten miles; thence to Lough Ree, forty-three; Lough Ree itself, seventeen; thence to Lough Derg, thirty-six; Lough Derg, twenty-three; thence to Limerick, fifteen; making together 144 miles. The mean height of Lough Allen above the sea at Limerick is about 143½ feet, being on an average about a foot of declivity per mile. Instead of the natural fall, however, the water has been reduced, by means of locks, to a series of level pools. The estuary or frith of the Shannon extends south-west about seventy miles beyond Limerick to its mouth, which is finally about eight miles wide between Loop Head and Kerry Head, at the Atlantic.

The direction of the Shannon from Lough Allen to Limerick, though generally south by south-west, is very circuitous, and broken by many streams, islands, and rocks. The soundings are as various, and both banks are liable to be overflowed by the river to a great extent; and the large expanse of the lakes would require a different sort of vessels from those which navigate the river. The works which have been constructed to overcome the natural difficulties of the navigation are either insufficient or in a state of decay; and it seems to be generally admitted that very little real good can be effected until the natural obstructions are removed, the number of lakes reduced, and

the channel deepened and improved in various parts; though it is still doubted if the navigation would even then be suitable for any thing but steam-vessels. The Shannon connects with the Royal Canal at Tarmonbury, and with the Grand Canal at Shannon harbour, near Banagher. At Shannon Bridge it receives, on the west, its principal tributary the Suck; on the east, the Inny, the Upper and Lower Brosna, Mulkerna, Maig, Fergus, &c. Much information on this and the other navigations of Ireland will be found in the Parliamentary Reports, particularly those for 1830 and 1834.

Slane or Slaney River is navigable from its mouth in Wexford Haven, for fourteen miles, to Enniscorthy.

Suir or Sure River unites with the Barrow in the estuary called Waterford harbour, about five miles below the town, and is navigable from that up to Carrick for sloops, and to Clonmell for barges. At the town of Waterford, the largest ships lie afloat in forty feet water.

The Tyrone Colliery Canal commences at the south-west extremity of Lough Neagh, proceeding by a short cut across the isthmus of Maghery to the Blackwater River, and, following it a short way, passes by another cut of three miles to the Colliery Basin, from which a railway extends to the mines.

NORTH AMERICA.

United States.

The advantages resulting to the United States from their separation from the mother country, and the great observation and rapid improvement which has taken place in the condition and circumstances of that republic since the American revolution, are in nothing more strikingly displayed than in the increased facilities of travelling and intercourse between the different parts of the Union, produced by the construction of roads, canals, and railways, and by the improvement of river navigation. But the spirit of enterprise with respect to internal improvement has been chiefly manifested, and has extended more or less to all the states of the Union, since the close of their last war with Britain. For although it is a considerable time since something was first done towards inland navigation in the United States, yet till then comparatively little attention was paid to this by the Americans. Indeed, as long as they were cramped by the narrow policy of the parent country, they had little inducement to undertake any thing of the sort; and from the peace of 1783 till the adoption of the present constitution they had not the means; besides, their peculiar situation and employment during the long wars in Europe rendered internal improvements of this kind less necessary. The experience of the last war between Britain and the United States, and the long peace which succeeded it in Europe, together with the vast expansion of American population, have shown the importance and necessity of such works, as well as others, in that extensive country; and, since the year 1815, the United States have progressed in these improvements with an unexampled rapidity. Most of the canals on the continent of Europe have been constructed at the expense of governments; in England chiefly at the expense of companies or individuals; and in the United States they have been made by the states and by individuals, aided occasionally by the general government. In locating canals in this latter country, two principal objects have been kept in view; one to insure a safe inland communication along the Atlantic border in case of a war with any power possessing a superior maritime force; whilst another and very important object

Navigation,
Inland.

¹ Macculloch's Statistics of the British Empire.

Navigation,
Inland.

has been to connect the waters of the western districts with those of the eastern, and thereby facilitate the intercourse between these two distant sections of the country. The vast expansion of population in the western parts, and the great and growing resources of that portion of the Union, have rendered such improvements of great importance, and have created rival interests in the eastern, in order to secure the advantages of this intercourse. The valley of the Mississippi is watered by rivers, some of which, only of the third rate, extend 1000 miles; and it is also indented by lakes the magnitude of which justly entitles them to the appellation of inland seas. Its population is spread over a country unrivalled in the extent and magnitude of its navigable waters, as well as in the fertility of its soil. The navigation of these great rivers, as well as that of many others, which was formerly very difficult, against the stream, has been wonderfully facilitated by the application of steam power, which has enabled the navigator to propel his vessel up the river, and to triumph over the violence of the torrent; and thus the rivers by which great continents are intersected have been rendered doubly valuable in facilitating the inland communications of the country, and in laying open the most remote and formerly sequestered scenes to the inquisitive researches of travellers. With respect to canals, there is no navigable line entirely artificial (for those of China are partly rivers) of such length as the Erie Canal, which is 363 miles, and was formed in about eight years. That of Languedoc, in France, is only 148 miles, and occupied fourteen years in construction, even during the reign of Louis XIV. However, the great canal of Amsterdam, in Holland, though only fifty miles long, contains twice as much water as the Erie Canal.

The aggregate length of canals now finished in the United States exceeds 2000 miles; but some of the states do not admit of their construction, except to a comparatively small extent, whilst others present a vast field and great inducements for prosecuting such works on a magnificent scale. Our limits, however, will only admit of a very brief description of these improvements; and to this we shall now proceed, following the order in which the states are usually arranged, and omitting of course such of them as are not possessed of canals.

Maine.

The Cumberland and Oxford Canal, twenty miles and a half long, extends from the tideway near Portland to Sebago Pond. It has twenty-six locks, and was completed in 1829. By means of a lock in Songo River, the navigation is continued into Brandy and Long Ponds, making in all fifty miles. Improvements have been projected in the navigation of the river St Croix and the adjacent waters. It has also been proposed to construct a canal from the mouth of the Sebasticook River, near Waterville, on the Kennebeck, to Moosehead Lake.

New

Hampshire.

Several canals have been constructed around falls in the Merrimack. Bow Canal, one third of a mile in length, three miles below Concord, with four locks, passes a fall of twenty-five feet. Hooksett Canal, fifty rods long, with three locks and a lockage of sixteen feet, passes Hooksett Falls. Amoskeag Canal, with nine locks and a lockage of forty-five feet, passes Amoskeag Falls, nine miles below Hooksett Falls. Union Canal, immediately below Amoskeag, overcomes seven falls in the river, and has seven locks in nine miles. A canal is now in progress around Sewall's Falls, in Concord.

Massachusetts.

The Middlesex Canal, connecting Boston harbour with the Merrimack at Chelmsford, two miles below Lowell, opens a water communication between Boston and the central parts of New Hampshire, and is twenty-seven miles in length. It has twenty locks, with a lockage of thirty-six feet; and is thirty feet wide at top, twenty at bottom, and three feet deep. It was completed in 1808, and was then the largest in the United States.

Blackstone Canal, extending from Worcester to Providence, in Rhode Island, is forty-five miles long.

The Hampshire and Hampden Canal, extending from the boundary of Connecticut in Suffield, to Northampton, is twenty-two miles long, and, forming a continuation of Farmington Canal, which is fifty-four miles in length, makes the whole line from Newhaven to Northampton seventy-six miles.

Montague Canal, for passing the falls in the town of that name, is three miles in length; and South Hadley Canal, around falls in the town of South Hadley, is two miles in length.

Farmington Canal, fifty-four miles long, commences at Connecticut-Newhaven, passes through the valley of Farmington River, cut, and at the boundary of the state of Massachusetts it unites with the Hampshire and Hampden Canal, which reaches to Northampton, and is twenty-two miles in length. Enfield Canal, five miles and a half long, is constructed around the Enfield Falls in Connecticut River.

The Erie Canal, extending from Albany on the Hudson River to Buffalo on Lake Erie, a total distance of 363 miles, is one of the greatest and most important works of the kind in the world. It was projected by an American patriot, Mr De Witt Clinton; commenced in 1817, and finished in 1825. The water is forty feet wide at the surface, twenty-eight at the bottom, and four feet deep. These are generally the dimensions of the other canals in this state, and therefore they cannot carry very heavy boats; but a less depth will always suffice if the boats are not encumbered with keels, which are utterly useless in a canal. The western section, from Buffalo on Lake Erie to Montezuma on Seneca River, is 157 miles in length, with twenty-one locks for a fall of 186 feet; the middle section, from Montezuma to Utica, is ninety-six miles, with eleven locks for a rise and fall of ninety-five feet; the eastern section, from Utica to Albany, is 110 miles, with fifty-two locks for a fall of 417 feet; total length 363 miles, with eighty-four locks for a total rise and fall of 698 feet. Lake Erie is 565 feet above the Hudson River at Albany. The average rise or fall of eighty-one of the locks is eight feet and a half, the other three are regulating or guard-locks.

This canal forms a channel by which the trade of the great inland waters of Lake Erie, Lake Huron, Lake Michigan, &c. may find access to markets in the populous cities of Eastern America and of Europe. Indeed there is already such a traffic on this canal and its branches, described below, that it has been proposed greatly to increase its dimensions, which must require many times the additional expense necessary to have made it sufficiently large at first. There is, however, nothing very remarkable in this, because the most proper size of a canal can seldom be foreseen by the projectors.

Champlain Canal, sixty-three miles long, commences, at its junction with the Erie Canal, nine miles north of Albany, and terminates at Whitehall, on Lake Champlain, in Washington county, thus connecting the Erie Canal and the Hudson River with Lake Champlain. It has seven locks for a rise of fifty-four feet from the lake to the summit-level, and fourteen locks for a fall of 134 feet from this to the Hudson, in all twenty-one locks; the rise and fall are 188 feet. It has a lateral cut connecting it with the Hudson by three locks at Waterford, eleven miles north of Albany, similar to the cut connecting the Erie Canal with the same river at West Troy by two locks.

The Oswego Canal, of thirty-eight miles, from Salina to Oswego, connects Lake Ontario with the Erie Canal. Half the distance is canal and half slack-water or river navigation. It has fourteen locks, thirteen of stone and one of wood and stone, for a fall of 123 feet from Salina to Lake Ontario.

Navigation,
Inland.

Navigation,
Inland.

Navigation,
Inland.

The Cayuga and Seneca Canal commences at the Erie Canal at Montezuma, Cayuga county, and terminates at Geneva, Ontario county, connecting the Erie Canal with Seneca Lake. It has also a lateral branch to East Cayuga village on the Cayuga Lake, being thus connected with that lake. It opens altogether a lake navigation of more than a hundred miles. The length is twenty miles and forty-four chains from Geneva, on the Seneca Lake, to Montezuma on the Erie Canal. It is half canal and half slack-water navigation, and has eleven wooden locks for a fall of seventy-three feet from Seneca Lake to the Erie Canal at Montezuma.

The Chemung Canal extends from the head of the waters of Seneca Lake to Chemung (or Utioga) River, a branch of the Susquehannah, at the village of Elmira, Tioga county. The length is twenty-two miles and a half, with a navigable feeder of thirteen miles and a half from Painted Post, Steuben county, on the Chemung River, to the summit-level; total, thirty-six miles. This canal connects the Erie Canal with the Susquehannah River. It has fifty-two wooden locks, with 516 feet of lockage, and one guard-lock.

The Crooked Lake Canal extends from Penn Yan to Dresden, both in Yates county, connecting the Crooked and Seneca Lakes. It is eight miles long, and has 260 feet of lockage, with twenty-seven wooden locks, and one guard-lock.

The Chenago Canal extends from Utica to Bingham, a distance of ninety-seven miles, with 109 locks. It has sixteen miles of navigable feeders.

The Delaware and Hudson Canal extends from the Hudson River at Kingston, to Port Jervis on the Delaware, fifty-nine miles; thence up the Delaware to the mouth of the Lackawaxen River, twenty-four miles; thence in Pennsylvania to Honesdale, twenty-six miles; total, 109 miles. From Honesdale a railway of sixteen miles and a half, with five inclined planes, rising 800 feet, extends to the coal mines at Carbondale on the Lackawana.

Haerlam Canal, of three miles, intended to connect the Hudson and East Rivers, is begun, but not completed. Chittenango Canal, connecting that place with the Erie Canal, is one mile and a half long, with four locks. Sodus Canal, intended to connect Seneca River with Great Sodus Bay on Lake Ontario, was projected in 1829, and will be twenty-five miles long. Scottsville Canal, intended to connect the Genesee River with Scottsville, in Monroe county, was projected in 1829. The Oneida Lake Canal, of eight miles and a half, intended to connect Oneida Lake with the Erie Canal, was put under contract in 1833. Auburn and Oswasco Canal, intended to connect Auburn with Oswasco Lake, was projected in 1832, and is to be three miles in length.

It has been proposed to connect by railways or canals the Erie Canal, somewhere about Rome or Herkinner, with the waters flowing into the St Lawrence at Ogdensburg.

The Genesee and Alleghany Canal. The projectors of the Erie Canal contemplated its connection with the river Ohio, by a south-west branch, uniting with the river Alleghany at Olean, in Cattaraugus county. A report of a survey of the line was made to the legislature in 1829. The length from Rochester along the valley of the Genesee to Olean, including navigable feeders, is to be 107 miles, which, with a side-cut to Danville of fifteen miles and a half, make the total length 122½ miles, with 1057 feet of lockage.

The Black River Canal is proposed to extend from the Erie Canal at Rome to the foot of High Falls on Black River, a distance of about thirty-five miles, with improvements in the navigation of Black River from the High Falls to Carthage, a farther distance of forty miles.

A steam-boat canal from Lake Ontario to the Hudson has

been proposed, extending from Oswego to Utica, and thence along the Mohawk to the Hudson. A steam-boat or a ship canal has likewise been proposed around the Falls of the Niagara. The longest proposed route would be fifteen miles, with a lockage of 320 feet; a second route would be nine miles, with the same lockage; and a third only seven miles and a half. A ship canal around these falls, on the Canadian side, called the Welland Canal, has been in operation for several years, and will be noticed hereafter.

Delaware and Raritan Canal extends from Bordentown New Jersey to New Brunswick, forty-three miles. A navigable feeder from Bool's Island to Trenton is twenty-four miles long. Morris Canal, extending from Jersey city to Easton, is 101 miles long. Salem Canal, from Salem Creek to the Delaware, is four miles long.

During the last eight or nine years, Pennsylvania has engaged in works of internal improvement more extensively than any other state in the union; and the Pennsylvania Canal and Railway, extending from Philadelphia to Pittsburg, a distance of 395 miles, is the most magnificent work of the kind which has yet been completed in any part of the United States. It consists of the following parts:

	Miles.
1. Columbia Railway, from Philadelphia to Columbia.....	81.60
2. Pennsylvania Canal, central division, or eastern and Juniata divisions, from Columbia to Hollidaysburg.....	171.75
3. Alleghany Portage Railway, from Hollidaysburg to Johnstown.....	36.69
4. Pennsylvania Canal, western division, from Johnstown to Pittsburg.....	105.00
	395.04

1. Columbia Railway commences at Philadelphia, passes Downingtown and Lancaster, and enters Columbia, on the Susquehannah, by an inclined plane 1720 feet in length. It has thirty-one viaducts, seventy-three stone culverts, and eighteen bridges. It attains its greatest height at Mine Ridge, which is 555 feet above tide-water in the Delaware.

2. The central division of the Pennsylvania Canal commences at Columbia; follows the east bank of the Susquehannah, crossing the Union Canal at Middletown; passes Harrisburg; crosses the Susquehannah at the head of Duncan's Island; and enters the valley of the Juniata, which it follows to Hollidaysburg. It has thirty-three aqueducts, and 111 locks.

3. The Alleghany Portage Railway, connecting the central and western divisions of the Pennsylvania Canal, commences at Hollidaysburg, passes over the range of the Alleghany Mountains, and terminates at Johnstown. It has one tunnel through a mountain ridge, and ten inclined planes, with stationary engines, five on each side of the summit-level, their total length being 4.37 miles. The total rise and fall is 2570.29 feet.

4. The western division of the Pennsylvania Canal commences at Johnstown, traversing the valley of the Conemaugh, Kiskiminetas, and Alleghany Rivers, and terminates at Pittsburg. It has sixty-four locks, sixteen aqueducts, sixty-four culverts, 152 bridges, and a remarkable tunnel about 1000 feet long.

The Beaver Canal extends from the town of Beaver, at the entrance of the Beaver River into the Ohio, to Newcastle, and is twenty-five miles long. The Mahoning and Beaver Canal, extending from Newcastle in Pennsylvania to Akron in Ohio, on the Ohio Canal, is now in progress. The Pittsburg and Erie Canal, of which the Beaver Canal is a part, is intended to connect the Pennsylvania Canal at Pittsburg with Lake Erie, and is to be seventy-three

Navigation,
Inland.

Delaware.

miles and a half long. There are various other canals in this state, besides some which are in progress, and others which are only projected.

The Chesapeake and Delaware Canal, which connects the Delaware River with the head of Chesapeake Bay, is partly in Delaware and partly in Maryland, and commences at Delaware city, about forty-two miles below Philadelphia. The length is 13.63 miles, the breadth at top sixty-six feet, and the depth ten feet.

Maryland.

The Chesapeake and Ohio Canal, begun in 1828, commences at Georgetown, on the Potomac, in the district of Columbia, and extends to Harper's Ferry. Its course, as laid out, extends to Cumberland on the Potomac, thence by Will's Creek, Youghiogeny, and Monongahela Rivers, to Pittsburg. The total length, as proposed, is 341 miles and a half, and the lockage 3215 feet. It requires a tunnel through the Alleghany Mountains of four miles and eighty yards. Port Deposit Canal, ten miles long, is designed to overcome the rapids of the Susquehanna above Port Deposit. The Chesapeake and Delaware Canal has been already noticed.

Virginia.

The Canal of Dismal Swamp commences at Deep Creek, about seven miles above Norfolk, and proceeds southward about thirteen miles to the boundary of this state, beyond which it is continued about nine miles in North Carolina, to Joyce's Creek, a branch of the Pasquotank. This canal is thirty feet wide at bottom, and eight deep. Very extensive improvements have been projected and partly executed on the river navigation of Virginia, by means of lateral canals or side-cuts. One on James River extends from Richmond for twenty-three miles up the side of that river, and then joins it again. There are various side-cuts on the Roanoke; one extends about twelve miles from Weldon upward, but that is after the river has got into North Carolina.

North Carolina.

Dismal Swamp Canal, already mentioned amongst those of Virginia, enters about nine miles into North Carolina; and Lake Drummond Canal, five miles long, is a navigable feeder of it. North-west Canal, six miles long, connects North-west River with Dismal Swamp Canal. Weldon Canal, twelve miles long, forms the commencement of the Roanoke Navigation, extending around the falls of the Roanoke above the towns of Weldon and Blakely. The navigation of the Roanoke from the Weldon Canal to the town of Salem in Virginia, a distance of 232 miles, as likewise the Cape Fear, the Yadkin, the Tar, the Catawba, and New Rivers, have been greatly improved.

South Carolina.

Santee Canal, twenty-two miles long, connects the harbour of Charleston with the Santee. By means of this and the Santee and Congaree Rivers, the navigation of which has been improved, a communication is opened between Charleston and Columbia. The navigation of the Catawba has been improved by five small canals of two, one and a quarter, two and a quarter, one and three quarters, and four miles. Saluda Canal, of six miles, extends from the head of Saluda Shoals to Granby on the Congaree. Drehr's Canal, of one mile and a third, is designed to overcome a fall of 120 feet in the Saluda River. Lorick's Canal, on Broad River, one mile and a half above Columbia, is a mile long; and Lockhart's Canal, in Union District, around Lockhart's Shoals in Broad River, is two miles and three quarters in length.

Georgia.

The Savannah and Ogeechee Canal, sixteen miles long, extends from the city of Savannah to Ogeechee River. An extension of this canal to the Alatamaha, sixty miles, is proposed.

Alabama.

Huntsville Canal, from Triana on the Tennessee, to Huntsville, is sixteen miles long. A canal of thirty-seven miles, from the head of the Muscle Shoals to Florence, is considerably advanced, but not yet completed.

Louisiana.

A ship canal, of eight miles, has been projected at New

Orleans, to lead from the Mississippi to the ocean. It is to commence about three miles below Fort Jackson, and pass through the prairie on the left bank of the river. Besides, there are in progress the Orleans Bank Canal, of four miles and a quarter, from New Orleans to Lake Pontchartrain; the Carondelet Canal, of two miles, which likewise connects New Orleans with Lake Pontchartrain, through the river or bayou St John, which is four miles, making the whole line six miles; and the Barataria Canal, proceeding from the Mississippi, six miles above New Orleans, to the Lafourche, thence through the lakes to Berwick's Bay, and thence to the sea by Barataria. It consists of four parts, amounting to twenty-two miles, which connect an extensive river navigation. The whole exceeds ninety miles.

Kentucky River Navigation, in the course of being executed, viz. the part of that river about to be rendered navigable by locks and dams, extends from its mouth up to where it branches into the three forks. For about 250 miles the whole will be slack water, adapted for steamboats of 150 tons burden. The locks are to be 175 feet long by thirty-eight wide in the chamber, ten feet above the dam; the depth of water is to be six feet; the lift of the locks from twelve to sixteen feet; the dams from twenty to twenty-five feet high, and from 400 to 500 long, and about seventy feet at the base. A variety of improvements, some of them of considerable extent, on other river navigations in this state, have also been projected, and are partly in progress.

The Ohio Canal, which extends from Cleveland upon Ohio Lake Erie, to Portsmouth on the Ohio River, is 307 miles long; it was begun in 1825, and completed in 1832. The summit-level is 305 feet above Lake Erie, 499 above the Ohio at Portsmouth, and 973 above the Atlantic. It has 152 locks for a lockage of 12,050 feet. The distances along this canal, beginning from Cleveland, are, to Akron thirty-eight miles, New Portage nine, Massillon twenty-one, Bolivar twelve, New Philadelphia fourteen, Gnadenhutten thirteen, Coshocton twenty-six, Newark forty, Bloomfield fifty-two, Circleville eleven, Chillicothe twenty, Piketon twenty-four, Portsmouth twenty-seven. It has three navigable feeders, amounting to thirty-three miles.

The Miami Canal, which extends from Cincinnati to Dayton, is sixty-nine miles long; it was begun in 1825, and finished in 1830. The summit at Dayton is 175 feet above the Ohio at Cincinnati. It has thirty-two locks for a lockage of 296 feet. This canal is now in the course of being extended along the valleys of the St Mary's and Au-Glaize Rivers, and is to be united at Defiance with the Wabash and Erie Canal, which extends from Lafayette on the Wabash River in Indiana, to near the entrance of the Maumee into the west end of Lake Erie. It is 187 miles long, and is nearly completed. The whole extent of this united line, from Cincinnati to Lake Erie, is about 265 miles, of which 105 are in Indiana.

The Mahoning and Beaver Canal, now in progress, extends from Newcastle, in Pennsylvania, on the Beaver division of the Pennsylvania Canal, to Akron on the portage summit of the Ohio Canal. It is eighty-five miles in length, but of this eight miles are in Pennsylvania. Sandy Creek and Little Beaver Canal, also in progress, extends from Bolivar on the Ohio Canal, in an easterly direction, to the Ohio River. Various other extensive navigations have been projected in this state, and companies have been formed for carrying them into execution.

Several extensive canals and river navigations have been projected in this state, and are partly in progress. We have already mentioned the Wabash and Erie Canal, of which part is in Ohio.

The Illinois and Michigan Canal, now in progress, ex-

Navigation,
Inland.

Navigation,
Inland.

District of
Columbia.

Florida
territory.

tends from Chicago on Lake Michigan, to Ottawa on Illinois River, a distance of about ninety-five miles. It is to be sixty feet wide at the surface, thirty-six at the bottom, and six deep. About twenty-four miles of this line are to be cut from seven to twenty-eight feet deep, through solid rock. Other canals have been projected in this state.

The Washington Branch Canal, of one mile and a quarter, connects the Chesapeake and Ohio Canal with the Potomac at Washington. The Alexandria Canal, of seven miles and a quarter, extends from that town to the extremity of the Chesapeake and Ohio Canal at Georgetown.

It has been proposed to connect the Atlantic Ocean with the Gulf of Mexico, by a canal across the northern part of the peninsula of Florida.

Canada.

Some considerable works for promoting inland navigation have likewise been executed in Canada. Of these the following are the principal ones.

The Rideau Canal commences in about long. 75. 35. E., and lat. 45. 20. N., at Entrance Bay, in the Ottawa River, about a mile and a half from where the Rideau River falls into it, 128 miles from Montreal, and 130 from Kingston on Lake Ontario. It is not so properly a canal as an artificial concatenation of natural lakes. The general direction is south-westerly, to its termination at Kingston; and the total length of the navigation is 132 miles, of which about twenty only are artificial cuts connecting Rideau River and Lake, Mud Lake, Cranberry Lake, and Kingston Mill-Stream. The difference of level is 445 feet, with forty-seven locks, which are each 142 feet long, thirty-three broad, and five deep. This canal, it has been fancied, would be of immense importance for the conveyance of military stores; but this seems to proceed on the assumption that the enemy is to be perfectly torpid during the half year in which the canal is useless from being frozen.¹

The Welland Canal, connecting Lakes Erie and Ontario, communicates with the latter by the Twelve-mile Creek, and thence ascends the barrier of Lake Erie, near the Falls of Niagara, by means of locks, till it meets the Chippawa, which it ascends for some length, and then joins the Ouse at about a mile and a half from its entrance into Lake Erie. The shifting bar at the mouth of this river has been remedied by extending piers into the deep water. A safe communication between these great lakes is thus effected by this navigation, which is forty-one miles long; the artificial part being fifty-six feet wide, and eight and a half deep. It has thirty-seven wooden locks, each 100 feet long and twenty-two feet wide, overcoming a height of 330 feet. A much shorter canal for passing round the Falls of Niagara has been proposed on the American side.

Grenville Canal consists of three detached parts, of the nature of side-cuts, or lateral canals; one at the Long Sault on the Ottawa, another at the fall called Chûte à Blondeau, and the third at the Carillon Rapids. This canal renders the navigation of the Ottawa between the Rideau and Montreal complete; but unfortunately some of the earlier constructed locks are only twenty feet wide.

La Chine Canal is a cut of seven miles across the south-east corner of the island of Montreal, to avoid some difficult parts of the St Lawrence, particularly the rapid of St Louis. It is forty-eight feet wide at top, twenty-eight at bottom, and five feet deep, with a fall of forty-two feet; but the locks only admit boats twenty feet wide.

By means of these great and useful works, a large ex-

tent of country is opened up to the industry of settlers. There is a continuous steam-boat communication in Upper Canada of about 460 miles, from the Grenville Canal, on the Ottawa, to Niagara. Many other canals are now in contemplation, such as that projected between the bay of Quinté and Lake Huron. A great deal of information regarding the inland navigation of Canada will be found in the Parliamentary Reports, and a more compendious account of it in Martin's History of the British Colonies.

The navigable rivers and lakes of North America are numerous and important, several of them being of vast extent. But a very general feature in such of its rivers as fall into the Atlantic, is a bar obstructing their mouths. That of the principal mouth of the Mississippi had, in 1722, about twenty-five feet of water upon it; Ulloa, in 1767, found twenty feet at the highest flood; and in 1826 the depth was only sixteen feet. Above these obstructions the rivers are generally much deeper, the Mississippi at New Orleans being above 100 feet deep, which depth it preserves to the mouth of the Missouri. Mobile Bay is crossed by a bar having only ten feet of water; and the bar of the Altamabo of Georgia has fourteen feet, which is perhaps about the average depth to be found at the entrance of most of the southern rivers of the Atlantic coast. Lake Superior, in the great central plain of this continent, is the largest body of fresh water on the globe. The outlet of this, and of the other great lakes of Canada, forms the river St Lawrence, which is of vast dimensions, the tide flowing up it for 400 miles, and affording navigation for the largest vessels the whole of this distance; but above this the current is extremely rapid. Several of the most difficult parts have already been avoided by means of side-cuts and locks, particularly the rapid of St Louis; and others may be disposed of in a similar manner. Vessels of 600 tons ascend to Montreal, and boats all the way to Lake Ontario, and thence to Lake Erie through the Welland Canal. The Connecticut is a large navigable stream entering the sea near the north-eastern extremity of Long Island. The Hudson has enabled New York to extend its commerce by the Erie Canal to the lakes, being navigable to 160 miles above its mouth for large steam-vessels. The Delaware and its tributaries afford a navigation over an extent of 300 miles in length and breadth. The Susquehanna, the Potomac, and others falling into the Chesapeake Bay, together with canals, afford navigation for vessels of one sort or other into the remotest valleys and recesses of the eastern country. The Roanoke, which falls into Albemarle Sound, together with the Pamlico, afford a medium of commerce for North Carolina; whilst the Pedee, Santee, Savannah, Ogeechee, Alatamaha, &c. are so many canals intersecting South Carolina and Georgia in all directions. The St John, again, affords a similar convenience for East Florida. But although the eastern rivers have been by much the longest employed for the purposes of navigation, they are in many respects inferior to the immense streams which intersect the western and inland states, particularly the Mississippi and its tributaries, which have no parallel in any other country possessed by a people sufficiently intelligent to turn the commercial facilities of its inland waters to proper advantage. The Mississippi is navigable for 3000 miles up from its mouth to the Falls of St Anthony, and extends over fifteen degrees of latitude. At St Louis it receives the Missouri, which above that junction is greater than the other branch, which still bears the name of Mississippi. The principal tributaries of the Missouri are the Osage, Grand River, Kanses, Platte,

Navigation,
Inland.

North
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¹ Canals, it is true, which are all on one level, as is the case in Holland, may become convenient roads whilst the ice is sufficiently strong; but where locks occur, and are so numerous as on this canal, they form a serious obstruction; and it is besides considered necessary in America to have canals as empty as possible during the frost.

Navigation,
Inland.

White River, Chien, Yellow Stone Rivers, each of which on an average adds 1000 miles to the navigation; and there are many others of less note. Above the junction of the Missouri the Mississippi receives, from the east, in latitude 37°, the Ohio, which is of great importance, as affording a direct communication with the eastern states, and being, besides, the channel of a great inland commerce. About 1200 miles from its mouth the Ohio receives, near Pittsburgh, the Monongahela and the Alleghany Rivers. It is connected with Lake Erie by means of the Ohio Canal, and has fifteen large navigable tributaries. The other principal tributaries of the Mississippi more to the north, and each navigable 400 or 500 miles, are the Illinois, Des Moines, Rock River, and St Peter's, between some of which and the great northern lakes there are only short portages. Besides all these, North America contains a vast number of other navigable rivers, which our limits will not admit of our describing.

SOUTH AMERICA.

The vast region of South America, though it has hitherto been kept in a sadly degraded state, by priestcraft, ignorance, slavery, and incessant wars, possesses a conformation peculiarly favourable to an extensive inland navigation. The Andes skirt its western shore, and, though ascending to a great height, are yet so small in breadth as to leave between them and the eastern coast a vast extent of comparatively flat country, divided into the basins of the Orinoco, Amazon, and Paraguay, none of which is much elevated above the sea; and even the dividing ranges between them are generally of very trifling altitude. Thus the Orinoco is navigable, without difficulty, for 260 leagues, to the falls or rather rapids of Atures, where, according to Humboldt, its mean height above the sea does not exceed 350 feet; and thence, after two short portages, it is navigable for above 100 leagues more, to the point near Esmeralda, where the celebrated bifurcation of this river takes place, and a portion of its waters descends along the natural canal of Casiquiari, to join the Rio Negro and the Amazon. On both sides, along its course, the Orinoco receives many tributaries; of which three in particular, the Apure, Meta, and Guaviore, flowing from the westward, have also long navigable courses. The Amazon, again, is navigable to a little above Urarina, near the confluence of the Guallaga, a distance of 750 leagues from its mouth, flowing uniformly along the whole extent, in a direction from west to east, and receiving many tributaries on both sides. By the Napo, Putamayo, and Japura it is connected with the higher districts of Columbia; its own upper navigation, which is uninterrupted above Santiago, connects it with Upper Peru; and the Guallaga and Ucaiyale descend to it from the south-west, along the eastern face of the Andes, from distances, as it is said, of from 300 to 500 leagues. By the Rio Negro, as already noticed, its waters communicate with those of the basin of the Orinoco; the Rio Branco ascends from this also to within a short and nearly level distance of the sources of the rivers Essequibo and Demerara; and its southern tributaries, rising in the Campos Parecis (the mean level of which west of Villa Boa, and in about 16° south latitude, where the waters divide, is not probably above 2500 feet), approach so closely to the sources of the Paraguay and its feeders, that near Villa Bella, in Matto-Grosso, only a short portage of three miles divides the course of the Aguapehy, falling into the Jaura and Paraguay, from that of the Guapore, joining the Madeira and Amazon; and, lastly, the Paraguay itself is navigable through nineteen degrees of latitude, from the confluence of the Jaura in 16° 20' south, to its mouth in the Rio de la Plata, near Buenos Ayres, in 35°

south lat., and receives also many tributaries along its course, of which four only need be cited, viz. the Parana and Uruguay from the eastward, rivers each nearly equal to the main trunk in value and importance; and from the west the Pilcomayo, said to be navigable with very little interruption as far as Chuquisaca; and the Vermejo, in which there are three fathoms as high as the junction of the Rio Grande, and large boats ascend beyond it as far as Tariga.

From these facts, then, it appears that, with the exception of one short portage of three miles, water flows, and is for the most part navigable, between Buenos Ayres, in 35° south, to the mouth of the Orinoco, in nearly 9° north latitude. The distance across the continent from east to west, through which the same convenience exists, varies greatly in different lines; but in the basin of the Orinoco it is not under 400 leagues, in that of the Amazons it is nearly 1000, and in that of the Paraguay it varies probably from 200 to 500. That all the interior provinces of South America would be prodigiously benefited by advantage being taken of these facilities for internal communication, cannot admit of a doubt; but the districts which are at present the most secluded, and which would be most strikingly improved by it, are those of Moxos, Chiquitos, and Santa Cruz de la Sierra, which contain about 43,000 square leagues, and produce a great variety of valuable articles, which are unavailable on account of there being no method of transporting them. The only seaport with which they have any communication is Lamar (Cobija), on the Pacific, although the junction of the Jaura with the Paraguay, where the latter becomes navigable, is only seventy leagues from Santa Anna, the capital of Chiquitos, a hundred from Santa Cruz de la Sierra, and seventy-three from Villabella in Matto-Grosso.

It has long been proposed to form a communication between the Atlantic and Pacific Oceans, by means of a canal across the Isthmus of Panama. A very interesting account of a survey of a line across the isthmus, which was made a few years ago by Mr J. A. Loyd, will be found in the Philosophical Transactions for 1830; and some account of a different line by the Lake of Nicaragua is given by Captain Philips in the Journal of the Royal Geographical Society (vol. iii. 275). There can be no question that a ship canal, if practicable, would be greatly preferable to any other equally slow communication; and a railway, again, better than a small canal. A line partaking of both is also talked of.

CONSTRUCTION OF CANALS, TUNNELS, LOCKS, &c.

Canals formed for navigation are generally upon a dead level from lock to lock, except when they are also intended for conveying water, whether to other parts of the navigation, or for some different purpose. Feeders or conductors of water to canals should always have a certain declivity; but even in these it is not customary to give the bottom a greater descent than four inches in the mile. The simplest mode of constructing a canal over level ground, is to form it partly by excavation and partly by embankment; that is, to proportion the depth of digging such, that the stuff thrown out shall exactly embank or raise the sides sufficiently to make the canal of the required dimensions. This is called level cutting. But when a canal runs along the side of a declivity, the one bank will require more raising than the other; or the cutting may be all at one side, and the embankment only at the other. If, again, the surface of the ground is undulating, the case becomes more complicated; but it is always a desideratum in the formation of canals, that the stuff excavated from one part may, with the least labour

Navigation,
Inland.

Navigation,
Inland.

or shortest carriage, exactly supply or form the embankments that are to be raised in another; so that, at the completion of the work, as few spoil-banks or mounds of useless soil as possible may remain, and as little ground as possible be rendered useless by excavations or pits. However, the great expense of rock-cuttings, and other difficulties, often occasion a wide departure from this rule. For, in conducting a canal across a hilly and rugged country, there are many difficulties to be overcome, much levelling, and many works of art to be executed. Some of these, perhaps, cannot be foreseen till the operations have been commenced or are far advanced. The slopes of the banks are regulated by the quality and difference in the tenacity of the soil; but they are seldom made greater than two feet of perpendicular to three of horizontal measurement, particularly where the embankments are heavy. The inside slope soon becomes chafed and indented at its upper edges by the motion of the water, which is occasioned by the passing of boats; and this abrasion often penetrates so much as to diminish irregularly the width of the towing-path. This may be remedied in a good measure by planting the sides with aquatic shrubs, and also by driving stakes into the bank at short intervals along the water line, so as to form a rude wicker-work, in places where the soil is loose and porous. The Caledonian Canal is provided with a break in the slope for this purpose, as was mentioned in the description of it. But the most effectual protection against the action of the water is attained by walling or paving the sides of the canal for some breadth both above and below the water line. This, however, from its being expensive, has not yet been extensively resorted to; but when it is recollected that the washing of the banks of a canal not only destroys its security, but diminishes its depth and the facility with which it is navigated, this reason loses its weight. By facing the sides with a substantial wall, which might be made nearly vertical at the top, the surface of the water need not be much more than two thirds the usual width, and consequently the canal need not occupy much more than three fourths the extent of ground; so that in situations where the ground is valuable, the wall would conduce to economy. The canal, too, having less earth crumbling into it, would need less cleaning; and where water is scarce, the smaller waste by evaporation, from the contracted breadth of the surface, would be of importance. To prevent as much as possible the wash, as it is termed, the speed of the canal-boats is variously restricted, and steam-boats have generally been excluded.

It frequently happens that canals have to be formed more or less by artificial embankments of loose materials, or that they are excavated in earth, sand, rock, &c. so very porous as to allow the water to escape by filtration. To remedy this, the usual method is to make the excavation much wider and deeper than the intended dimensions, and to line it to the thickness of two or three feet with a tenacious clay mixed with gravel, which is to be thoroughly puddled, and then, according to some, exposed for a long while to the weather, though others condemn exposing it at all. A trench four feet in width is also dug out in the middle of each side-bank, to at least three feet below the bottom of the canal, and this in like manner is to be filled up with puddle. The puddle trench is made principally with the view of preventing rats and other vermin from perforating the banks, and occasioning breaches, as they often do. When once the water has obtained a very small egress, it gradually washes it wider; so that sometimes in a few hours a breach may be formed sufficient to empty the canal, and require weeks or even months ere it can be repaired. But besides being able to resist the penetration or gradual escape of the water, an embankment must always be composed of materials capable of withstanding, by their weight, the ten-

dency of the hydraulic pressure to overturn them in a mass, and also of resisting, by their lateral adhesion, the force tending to thrust them out horizontally. When the side of a canal gives way, it is of great consequence to prevent as much as possible the escape of the water. For this purpose, it is usual to have doors or valves in various parts of the canal, so attached by joints or hinges to the bottom, that when the water is at rest they lie nearly flat at the bottom, but when it begins to flow rapidly over them, they rise by its force, and arrest its farther progress. However, when such gates have lain long in the bottom, and have become coated with slime and imbedded in the mud, their spontaneous rising at the proper time is not much to be depended on, and therefore they should be provided with chains or rods, by which they may be drawn up when required.

Tunnels.

The first thing to be attended to in constructing a tunnel is to execute a correct survey of the ground through which it is intended to pass. This is done by tracing over the surface of the ground a line which shall be all in a vertical plane parallel to the direction of the tunnel, and which, when transferred upon a reduced scale to paper, shall accurately represent a vertical section of the ground. To obtain a section of this sort with accuracy for an extensive tunnel, the relative levels of the principal points along the line upon the surface are to be ascertained; and it is generally necessary to use an instrument similar to a transit telescope, and perhaps to fit up one or more temporary observatories upon the most elevated spots along the line, from which may be determined the position of any pits or shafts which it may be necessary to sink, whether for the sake of free ventilation, or for commencing and carrying on the excavation of the tunnel at several different places at the same time. Through these openings the stuff is to be hoisted up, and the water pumped out should any occur. The shafts being sunk to the requisite depth, which is ascertained from the levels which have been taken at the surface, a heading or small tunnel, at least sufficiently high and wide to allow the men to move freely in the work of excavation, is to be commenced just below the crown of the intended large one. Such smaller excavation is generally made very unshapely in the sides and roof, but ought to be nearly flat in the bottom. It is to be carried forward from one working shaft to another, as nearly as may be in a straight line, till a connection be formed between all the shafts and the ends of the tunnel. If, in the progress of the heading from one shaft to another, the air become so bad as to oblige the workmen to desist, an air shaft is to be immediately commenced from above, about five or six feet in diameter, and sunk vertically to the point at which the heading was left off. In excavating the tunnel of the Thames and Medway Canal, there were twelve working shafts; and, on account of the foulness of the air, it was besides necessary to sink eleven air-shafts. After the heading has been driven from one working-shaft to another, or a complete perforation obtained throughout the whole of the intended line, the roof of the tunnel is commenced, by an excavation in the form of a circular, an elliptic, or a parabolic arch. At this stage of the work the strength and quality of the roof are easily ascertained; and where weak and crumbling portions occur, a brick or stone arch must be formed for their support. The stuff is generally carried out by means of a railway. Some tunnels are formed in strata of such a texture as to require no building whatever, unless, perhaps, in fitting up a towing-path; whilst others are so very insecure that the construction of a complete lining of building must keep pace with the work of excavation. Some tunnels, again, are naturally water-tight, whilst others

Navigation,
Inland.

Navigation,
Inland.

require a substantial lining of clay, and must be excavated of so much the larger dimensions as to have room for it.

might save a little time, but in general the case would be otherwise.

Navigation,
Inland.

Inclined Planes.

It is probable that the earliest mode of passing a boat from one level to another consisted in simply dragging it over the intervening space, whether that might be a natural rapid in a river, an obstructing rock, or a dam built across on purpose; and this last was generally in the form of a ridge, or double inclined plane. In a rapidly descending current it was necessary to have many such dams at short intervals, in order to obtain the requisite depth of water. In China these inclined planes have been long in use, especially in their smaller canals. Between the upper and lower levels of the water a double glacis of hewn stone is built, the principal slope of which extends from the bottom of the lower canal to the surface of the water in the upper canal, or a little above it, and there terminates in a large cross beam of wood, rounded off, and very smooth. From this beam another but shorter and steeper plane of stone descends to the bottom of the upper canal; and over these the boats are dragged, sometimes by simple manual power, and sometimes by the aid of capstans. It is not uncommon in China for a hundred men to be employed in drawing up a large vessel from the lower to the higher canal. Their strength is usually applied by means of levers turning capstans, which are placed on the abutments on each side of the glacis. A rope being passed round the stern of the vessel, has its ends attached to and wound round the capstans. In this way a vessel is more speedily raised into the upper canal than if locks had been employed; but it is effected by a prodigious exertion of human force, which, however, in China is always to be had at little cost, and is there preferred to any other. When a vessel is to be transferred from the upper to the lower canal, she is, as before, lifted over the cross beam, and then glides safely down by her own weight. To insure this, the head of the vessel is provided with a railing, which being covered with a strong matting at the time of the descent, not only breaks the fall, but prevents any water from flushing up over the deck. We here see human power sadly lavished away where a very different one might suffice. Horses, oxen, water-wheels, &c. are in some countries applied to turn machinery for the same purpose. To lessen the friction, long rollers are sometimes placed across the inclined planes, at short intervals from each other; but it is evident that, whether with or without rollers, boats which will bear to be dragged over any such structure must be excessively strong for their size. The long feeble boats which usually navigate canals would undoubtedly break into several lengths were they to be passed over the ridge. Sometimes the boats are placed upon a sort of cradle or hurdle, with or without wheels, and the whole dragged over; and sometimes the boats themselves are furnished with wheels, which only come into play in passing such planes.

There have been numerous other contrivances for transferring boats from one level to another, without any expenditure of water; and descriptions of the most of them will be found in some of the scientific journals, particularly in the Repertory of Arts, Nicholson's Journal, the Philosophical Magazine, and the Repertory of Patent Inventions. But these have generally been very unsuccessful, although for not a few of them patents have been obtained. One of the most recent patents is that of Mr Thomas Grahame, of which the specification is published in the Repertory of Patent Inventions for March 1837. By far the greater number of the schemes now alluded to would require an exertion of mechanical force which would either be more than sufficient to raise water to fill a common lock, or would be attended with greater expense. Some of them, it is true,

Locks.

Amongst the many approximations to the gates of a lock, the following rude one may be mentioned, especially as it is still used in various parts of England. A beam or sill is fixed across the bottom of the stream or canal; and directly over this, but at the water's surface, is placed a second but moveable beam. Against and behind these parallel beams a set of loose boards are placed upright and close together like a door, so as to obstruct the progress of the stream. When a boat is to pass, the boards are either removed singly, or, if they can be prevented from floating away, the upper beam is lifted or moved round, so as suddenly to let go the whole system, and thus afford a temporary increase of depth, to enable the boat to pass or repass the otherwise too shallow water. In China it is common to have a similar set of loose boards or planks, but placed horizontally across the stream; these being dropped one by one into grooves formed in the side walls, or in upright posts, from which the boards are to be singly removed in a similar manner. Such are the sluices or gates used on the Imperial Canal of China; for the emperor's boats or barges are far too large to be dragged over inclined planes. Machines of the same sort have also been used on the river navigations in Flanders. Since both the kinds of gates now described are supposed to be placed at the upper end of the fall or shoal over which they are temporarily to increase the depth of water, and since the boat is to pass through the gate, while the accumulated water rushes out with great force, it is evident that this must render it difficult for a boat to ascend the stream, and must accelerate it too much in descending. However, a method similar to this, at least in letting go a flash of water, has long been used in floating down rafts of timber over shallows and rapids in rivers, and is perhaps the best that could be contrived for the purpose. But for the navigation of boats there is a greatly preferable mode of using the same sorts of gates, so as to be free from the inconveniences above mentioned; which is to place the gate in moderately deep water at the lower end of the fall or shoal, and such that a boat may pass up through the gate before the water has been raised by it at all. The gate is then shut till the water rise sufficiently to enable the boat to ascend the fall or shoal, which it does in almost still water. These sorts of gates Lalande calls half-locks; and indeed it is supposed, with considerable probability, that the casual position of two of them near each other had given rise to the invention of the lock. For in that case it would soon be seen, that when the lower of these two gates was closed, and the water above it had risen to a sufficient height, such water would be nearly stagnant at the upper gate, and would afford an easy passage through it. If, therefore, the boat was ascending, the upper gate being next shut, the water above it would rise, and enable the boat to proceed a stage farther in its ascent.

However the real origin and early history of the modern lock, like those of many other valuable inventions, are involved in obscurity, yet its nature and mode of operating will be readily understood by a reference to figs. 1 and 2, Plate CCCLXXVIII. where A A A A are the walls of the lock chamber, which can be closed by the two single gates G, G. The water in the part or *reach* of the canal which lies to the right of the lock is supposed to be higher than in that to the left. When, therefore, it is wished to pass a vessel upwards through the lock, she is first floated in at the lower gate, previously opened, as shown in fig. 1, and which is next to be shut. Water is then admitted through a valve from the upper canal into the lock-chamber, till it has filled it up to the same level, and has of course raised the

Navigation,
Inland.

Navigation,
Inland.

vessel along with it. The upper gate being next opened, the vessel quits the lock, and passes immediately into the higher part of the canal. This process is called *locking up*; and the reverse of it, or *locking down*, will obviously conduct a vessel down through the lock, which is to be emptied by another valve into the lower reach of the canal. For when the water in a lock is reduced to the lower level, it is usually said to be *empty*, although it has still the same depth of water as the lower canal.

In navigations where great differences of level are to be overcome, it is not unusual to have two or more locks following in such close succession that the lower gate, or pair of gates when they are double, of one lock, forms also the upper gate or upper pair of the next lock below it. This obviously tends greatly to lessen the cost of constructing them, and also requires fewer lock-keepers. It tends, besides, to lessen the time spent in the repeated stoppages and startings in the trackage of the boats; though it is rather blamed for expending somewhat more water than if the locks were scattered separately over a considerable extent.

It was not until artificial canals had become very general, that locks were brought to any thing like their present state of perfection; for the difficulty of procuring water had been but partially felt, as long as inland navigation was confined to a few rivers. But when the value of water for canals came to be properly appreciated, it was necessary to be careful of every resource, and to use it with the strictest economy. With this view the chamber, or the space between the upper and lower gates, instead of being made of an oval, a circular, or an octagonal figure, as in the locks on the earlier canals, was so much contracted as only to afford room for the vessels to pass through; to effect which, the sides were made vertical planes formed of wood, brick, or stone, instead of the sloping banks of earth or turf used in the older locks, and which required such a length of time to fill or empty them, and consumed a vast quantity of water besides. The *lift* of the lock, or the difference of level which it is made to overcome, is regulated by circumstances. It varies from one foot or less, up to sixteen or eighteen feet. Where the levels of the parts of a canal, or of the several *reaches* as they are sometimes called, differ greatly, and where water is plentiful, the locks are generally made with a greater lift than where the ground is more flat and the water scanty. For a given difference of level, locks generally consume more water as the lift of each is greater; but, on the other hand, they tend to save time. The chambers of narrow locks are generally from seventy to eighty feet long, and from seven to eight feet wide. Those of the Caledonian Canal are from 170 to 180 feet long, forty wide, and thirty deep; and still larger ones are used on the great ship canal from the Texel to Amsterdam; but locks are also made of every intermediate dimension.

A naturally hard bottom is the best foundation for the walls of locks; but where that does not occur, they are frequently built on a system of piles well driven and bound together; for the mode of preparing the foundation must be regulated by the nature of the ground. The sides are carried up sometimes in straight, sometimes in curved lines, and often reclining or battering outwards from the bottom. In this last case, too, the beds of the stone or brick-work are generally formed at right angles to the face of the wall, inclining from half an inch to an inch in the foot. Such battering, however, should only be used near the bottom; because, *cæteris paribus*, a lock the opposite sides of which are perfectly vertical and parallel planes, and which is of no greater width throughout than to admit the boats, must obviously consume the least water, and spend least time in passing a boat; a circumstance which ought always to outweigh any little saving of materials or

expense which might be expected from a different form of construction. Curving the sides longitudinally, like cresscents, can add nothing to the strength on the principle of the arch; because such a figure is at best an arch having nothing to abut against. The like may be said of dishing-carriage wheels, and of all curved structures which either have no abutments, or which are not equally pressed against all their abutments. At Agde, on the Languedoc Canal, a circular basin which unites three canals of different levels is used as a lock, and has long been extolled as the very perfection of lock-making; whereas it requires a needless length of time, and wastes an enormous quantity of water in passing a boat. If the foundation be clay or gravel, a wooden bottom is sometimes formed of cross sleepers planked longitudinally, upon which the side-walls are built with or without buttresses at the back, according to the quality of the side-banks. A flat segment or inverted arch of stone or brick is sometimes laid upon the wooden bottom, in order to distribute the weight more equably, and to prevent any partial settling or subsiding of the work; and the same method is observed between the buttresses along the outside of the chamber walls. In each wall, behind the hollow quoins, a recess is left sufficient for the gates to open back into, out of the way of the vessels. In the recesses belonging to the upper gates, a weir or overfall for the water is provided, four or five feet long, having a coping or sill of stone or brick, just the height at which the water is intended to stand in the upper reach of the canal; these are called the *paddle-weirs* or *lock-weirs*. A large flat stone is usually laid as a lintel over this opening, to complete the wall upon, and leaving a space of three or four inches in height for the egress of the surplus water. This cavity is conducted downward, diminishing in width and enlarging in depth, behind the walls of the lock, into the paddle-hole or culvert for filling the lock, if such be in use there. This water having got into the lock, makes its escape from it by a similar opening at the other end into the lower canal. In other cases a culvert is purposely continued behind the wall, so as to carry this surplus water quite past the lock to the lower canal. Sometimes an open channel, properly lined with stones or bricks, is made for it. But in many cases, where the surplus water would be of no use in the lower canal, it is allowed to escape over a waste weir, built on purpose in the side of the canal, into some river or brook which may be near. In order that any considerable quantity of water may be readily withdrawn from a canal when required, it is generally provided in various places with waste-gates or sluices in its sides, which can be drawn up either with a rack and pinion, a chain and roller, or a crow-bar, as circumstances may render most eligible. Sometimes pipes furnished with valves are placed in the bottom of the canal for withdrawing the water.

The frame of a lock-gate usually consists of two strong upright posts, connected by horizontal ribs; and the latter are closely covered with boards or planks caulked like a ship. The gate, again, generally turns horizontally on one of these uprights, which is called the *heel-post* or *coin-post*, whilst the opposite one is named the *head-post* or *mitre-post*. Large gates are frequently curved, so as, for greater strength, to present an arched or convex surface to the pressure of the water; and on this point there is an interesting article by Mr Barlow in the Transactions of Civil Engineers (vol. i.). It was usual to make all such gates of timber; but, on account of the difficulty of getting it at the time of sufficient size for those of the Caledonian Canal, the most of the gate-frames for it were made of cast iron, boards being still used for covering the ribs. Other locks have since been similarly constructed; and iron gates cast in one piece have been used on the Ellesmere Canal. But wooden gates are by some engineers preferred to those of

Navigation,
Inland.

cast iron, which are apt to corrode and get out of order, especially if exposed to the action of salt water. In England the cost of gates for large lock-chambers is nearly the same, whether they are made of wood or of iron. Some canal gates are made to rise and fall vertically, like those of ancient castles and temples, or, like our common windows, counterpoised by weights, which slide in grooves. The locks on the Shrewsbury Canal are not only closed by two gates of this sort, but can also be divided by others, so as to admit or contain one, three, or four boats at a time, without the loss of any more water than is just necessary to regulate the ascent or descent of the boat or boats that are then in the locks.

As it would on several accounts be inconvenient, and often impracticable, to open lock-gates against a strong pressure, they are either provided with smaller apertures furnished with valves, through which the locks are emptied or filled before opening the large gates themselves; or, instead of apertures in the gates, the water is passed through one or more culverts or pipes formed in the walls of the lock, these being in like manner furnished with sliding valves or paddles. The valves of lock-gates are generally opened and shut by a rack and pinion attached to the lever beams of the gates, and moving in vertical guides spiked fast to the lining of the gates. They are formed of wood, and placed near the middle of the gate at the bottom. A rack and pinion are likewise generally employed to open and shut the valves of culverts.

Sometimes the valve in a lock-gate is formed into a large lever, shaped like a rudder, which extends from near the bottom of the gate, and passes through a guide fixed on the side of the beam. One edge is hinged on a pivot about four feet above the bottom of the opening, the side-works against the lining of the gate, and the top is drawn backward and forward by means of a rack and pinion fixed on the lever beam. This is in some respects a convenient contrivance, being easily worked by the boatmen, without the awkward necessity of standing upon the lever beam.

Another method of constructing the valves, especially for large tide-locks, where the gates have no lever beams, but move upon rollers by means of a drag-chain, is to form two apertures above one another, each about one foot high by two feet wide, and to connect the two valve-covers by links at the same distance apart; so that a motion of one foot perpendicular, given by a coarsely threaded screw, fixed upon the head of a connecting rod, will open and shut four superficial feet of aperture through the gate.

But since all sliding valves are necessarily attended with much friction and wear, and it is likewise inconvenient to have any valve in the gates, we should think a greatly preferable method would be, to use a culvert departing perpendicularly in the bottom of the canal or of the lock-chamber, and to close it there with a horizontal lid or valve, hinged at one edge, and having a long arm or lever projecting from its opposite edge. In this simple construction, it is obvious that a mere rod or chain attached to the lever might have any required degree of power to raise the valve; which, on being let go, would readily, of its own accord, shut down out of the way. This method would scarcely either be attended with friction, or be subject to wear.

Many of the canals of England which have succeeded best are both narrow and shallow;¹ and consequently

their lock-chambers are narrow and long, particularly those of the Grand Trunk and Birmingham Canals. Fig. 1 and 2, Plate CCCLXXVIII. show one of these, which is seventy-five feet long and eight wide, with vertical and parallel sides AAAA, built of brick, four feet thick, and coped with stone. The gates G, G are single, hung in a stone quoin or coin, and they shut against a rebate of stone, which is lined on the corners with a cast-iron plate two inches thick and six broad, screwed fast to the coins. The gates are framed simply with square ribs, and a single lining of plank; they contain no valves, as the chambers are filled by side culverts *c t v*, formed through the wall, and entering in the recess left for the gate to fold back into. The valve *v* of these culverts is opened or shut by turning the handle *w*, which works a pinion and rack attached to a post about eight inches square. The gate is opened or shut by pushing round the long lever beam B, which is fixed along the top of the gate, and is purposely made very heavy to act as a counterpoise to the weight of the gate. The lower end of the coin-post, or principal upright post of the gate-frame, has a pivot which turns in a socket at the bottom; and near its upper end, at P, it is embraced by and turns in a collar held by the clamp *a*, which has two long diverging arms made fast in the top of the building.

The lock-chambers built by Brindley upon the Duke of Bridgewater's Canal at Runcorn, upwards of sixty-five years ago, are still in good order. They are formed with vertical sides of brick, coped with heavy stone clamped into the heart of the wall, and are sixty feet long by thirteen wide. The gates are double, and form, in meeting, a very acute-angled mitre. The valves or paddles are opened perpendicularly by a rack and pinion on the beam. There are two of these apertures in each gate, about twenty inches square. The hollow coins or grooves in contact with the gates are of timber, bolted and clamped into the brickwork.

Fig. 3, 4, and 5, Plate CCCLXXVIII. represent one Tide-lock. of the tide-locks of the Thames and Medway Canal. Its walls AAAA are of brick built upon piles with a wooden bottom, upon which is laid an inverted arch, the sides battering into the bottom curve from the water line. The gates G, G are double, and curved so as to form nearly a circular arch in meeting. Their frames are made of cast iron, and their coin and mitre posts are formed hollow like a pipe, with oblong openings in the sides for the workman to put in his hand with the bolts which are to fix the horizontal ribs. Formerly, when such posts had no openings in their sides, it was necessary that a boy should go inside with the bolts, like a sweep into a chimney. The ribs are about eighteen inches apart, an inch and a half thick, curved in plan, with a flange on each end, which is bolted into the coin and mitre posts. The ribs are covered with planks two inches thick, bolted to the ribs, and caulked in the joints like those of a ship. These gates are very heavy, but rest in a great measure upon rollers, which run on the curved tracks *r, r, r, r* when the gates are moved by the capstans C, C, C, C, and drag-chains winding round them, as seen in fig. 5, and denoted by the long, cross, dotted lines in fig. 3.² These chains pass through holes in the walls O, O, as seen in fig. 5, where also the curve I denotes the inverted arch. This lock is filled and emptied through culverts, as described in the account of the single lock of the Birmingham Canal.

As the tide-water flows and rises above that within, it

Navigation,
Inland.

¹ There is little room to doubt that such would have been still more successful had they been of larger dimensions. However, the contrary error seems to have been committed in the too large dimensions of the Grand and Royal Canals of Ireland, and in the Caledonian Canal.

² In some locks, instead of the drag-chain, a pinion is formed on the axle of the capstan, and works into a toothed rack attached by a joint to the gate. As the pinion and rack can work both ways, only one capstan is required for each gate; whereas the chains always need one capstan to open the gate and another to shut it.

Navigation,
Inland.

pushes open the gates G, G, and passes into the basin and canal; but this can also be stopped or prevented by shutting the gates *g, g*, which, opening outward, cannot give way to external pressure. The lock-chamber is 130 feet long within the outer gates, and thirty wide. It is about ten feet deeper than the canal, and eight wider than the tunnel, which is only twenty-two feet; so that much larger vessels may come into the basin, whose bottom is even with that of the lock, than those which can get through the canal. By these means, too, boats drawing almost eight feet, the ordinary depth of water in the canal, may pass through the lock when the tide-water without is ten feet lower than in the canal.

This lock exhibits one feature which, though common a century ago, we should not have expected in a first-rate lock made in the nineteenth century; we mean the curvature of the side walls, which contributes rather to weaken the structure, because, instead of these curved sides acting as arches having something immovable to abut against, their only tendency in the circumstances is to transfer the lateral pressure from the middle of the walls, where the stress is least, to the very parts on which the gates are hung, and which, of course, already sustain the greatest strain, and therefore have more need of being relieved or assisted, than thus burdened with any such unnecessary or additional strain.

When a boat is to be raised through a given height, there is not necessarily any difference in the expense of water, whether the ascent be gained by one previously empty lock, embracing the whole lift, or by ever so many sharing it; for since the boat on ascending leaves all the locks full, there must at least be as much water used as would fill up one deep lock from the lower to the higher level, and which ought just to fill ever so many shallow ones. However, when the locks have been previously full, the water of one only need be expended, and therefore the less the lift of each, the less will be the expense of water. On the other hand, it is obvious that many small lifts unavoidably put off much time. Again, when a boat is to have a given descent, this may be effected with as much less expense of water as the number of locks, if previously empty, is greater; because, whatever water suffices for one of a series of equal locks, may successively serve each of the rest during the descent. When the locks have been previously full, the whole of them are emptied by the descent of a boat, whether they are many or few. However, there is this difference between an ascent and a descent: A boat in ascending lets down or consumes twice the weight in water of itself and cargo more than it does in descending; because, on entering the empty lock, the boat which is about to ascend expels as much water into the lower reach of the canal as equals the weight of itself and cargo, whereas a boat about to descend expels from the full lock an equal weight of water into the upper reach of the canal. The former is therefore lost, whilst the latter is saved.

The failure of the schemes hitherto projected for remedying the defects of the common lock are ascribed by M. Girard to the impossibility of resolving the problem completely, without an unnecessary expenditure of mechanical force; and he therefore reduces the maximum effect of the common lock to questions of the comparative time and economy required by boats in passing insulated locks, and in passing connected systems of locks. But he does not, says Mr Rennie,¹ consider the stoppage and the loss of time attending the repeated changes in the force of trackage required by the isolated system. The value of the

water lost can only be contrasted with the value of time under certain circumstances; but the question had already been discussed by Gauthy and others with reference to the locks of the Canals of Briare and Languedoc.

Navigation,
Inland.

Economy of Water.

There have been numerous expedients for more effectually economising the water of canals. By making the locks double, that is, placing two equal locks on the same level in the breadth of the canal, a much smaller quantity of water will generally suffice. For since a boat on descending must enter a full lock and leave it empty, whereas an ascending boat must enter an empty lock and leave it full, it would obviously be a saving of water could the full lock, by which a boat had ascended, be reserved for the next boat which should descend, and *vice versa* with the empty one; though it is evident, that when several boats pass together in the same direction, this can only be partially done. But when the one lock is full and the other already empty, and we wish to let down a boat through the former one, half the water might always be let through a sluice into the empty lock, instead of letting the whole go to waste in the lower canal; and in like manner, when we wish to raise a boat through the empty lock, half the water may be obtained from the full one. By putting more than two locks in the breadth of the canal, still less water would sometimes suffice; but the increased cost puts this out of the question.

A different method of saving water is by means of *side-ponds*, into which the water is partly withdrawn from a full lock, and reserved for farther use. Sometimes a single side-pond is employed, and sometimes two or more, being all upon different levels. A single pond, no matter how extensive, cannot, in the usual way in which it is employed, save quite half the lockful of water, two ponds cannot save quite two thirds, nor can three save three fourths, &c. But it is most common to employ two ponds, each having the same horizontal area as the lock has, and being made to receive one fourth its fill of water. The one of these ponds has its bottom at half the height or lift of the lock, so that when a valve is opened into it from the full lock, this pond receives one fourth of its contents. This valve is now shut, and another valve opened between the lock and the second pond, which, in its turn, receives another fourth of the water, because its bottom is at one fourth the height or lift of the lock. The second valve is now shut; and the remaining half-full of water in the lock is let go into the lower canal in the usual way. When the lock is to be filled again, the lower pond is first run into it and closed, and then the higher one, which together make up one half of what will fill the lock, and which has been saved by means of the ponds.

A great improvement on side-ponds has been proposed by Mr Field (Transactions of Civil Engineers, vol. i. p. 61), which is to apply to them the principle of the pendulum, or rather of water vibrating in an inverted syphon, viz. that it would rise to the same height in the one leg as that from which it has fallen in the other, were it not for friction or other resistance. Mr Field's method is to connect a lock with a side-pond by means of a long pipe or culvert, in such a manner, that when the water in the lock is allowed suddenly to run into the empty pond, it may rise in the latter nearly to the level from which it had fallen in the former; and at the moment this occurs, the valve or sluice in the culvert is to be shut. The same thing should obviously take place when the water is to be restored to the empty lock, excepting that, whatever may have been

¹ Reports of the British Association for 1834, p. 459.

Navigation,
Inland.

the loss of water in the former case, the total loss will now be doubled; but this additional loss would be avoided by using a second lock alongside of the other, instead of a pond, as no restoration would be required.

On one point we beg to differ materially from Mr Field. In all the five different forms in which he has illustrated his method, he assumes it as absolutely necessary that the long culvert should always have *two* valves, one at each end; and in order to get these two valves near each other, he proposes to bend round the culvert in a spiral or circular form. Now, with all deference, we presume, that if the culvert be kept as low down as it ought to be on several accounts, any more than one valve will not only be troublesome and expensive, but occasion a needless obstruction to the free motion of the water. Indeed, to avoid giving a great and sudden lateral shock to any boat or vessel whilst in the lock, it would be proper that the water should enter or depart perpendicularly in the middle of the bottom of the lock. In that case it would not be very material in what part of the culvert the valve was situated, except for the greatest convenience. It would perhaps be an improvement to give the culvert very wide spreading mouths or ends. If, however, Mr Field's ingenious scheme should save nine tenths of the water, as he expects it to do, it would have the farther advantage, that the gates of such locks could generally be opened without their needing to have any valves or paddles to be previously opened, either in them or in the walls. Mr Field makes his method to depend on the principle of Montgolfier's ram, a principle, we beg to observe, which had been discovered, applied, and published by Whitehurst, long before Montgolfier's time; but it is much more elementary and simple, we presume, to refer, as we have done, so much of Mr Field's scheme as has now been described, to the undulations of water in a syphon.

Where canals are all on one level, and have either no locks at all, or at their extremities only, there is seldom much difficulty in supplying them with water; though in certain cases canals of this sort may communicate with some very muddy river, whose waters, if admitted, would soon silt them up with mud. In such cases it has been recommended to exclude the muddy water, and, if nothing better could be done, to supply the canals with clean water, raised by a steam-engine. This method has been followed in the case of the West India docks on the Thames, where the foul water of that river, after having stood in a basin till it has deposited its mud, is pumped up into the docks by a steam-engine. But where a canal is to form a communication between separate valleys or basins of a country, and where a double lockage is unavoidable, the summit-level which divides the rise and fall is generally too elevated to permit a regular supply of water being drawn directly from the streams on either side. In such cases it becomes necessary to collect the flood waters of the adjacent higher grounds into proper reservoirs, to be used as circumstances may require. Some canals are provided with very large receptacles for the flood-waters. That of Languedoc has one of 595 acres; and one belonging to the Trent and Mersey Canal covers 160 acres. But cases occur in which no such supply can be obtained, and where, of course, it is necessary either to raise water by steam-engines, or to employ inclined planes or machinery to pass the vessels, or at least their cargoes, from one level to another.

RIVERS.

Engineers are generally agreed that side artificial canals are eventually more judicious than the attempts to dredge or to deepen channels in the beds of the streams

themselves; and that, for the purposes of navigation, rapid rivers are only useful to supply canals with water. On this account, locks are rarely constructed in the beds of rapid rivers. It is more usual to apply them to side-cuts or to a lateral canal, formed for the purposes of the navigation, and to leave the river course for the passage of the floods or other surplus water. A quick bend of the river is generally chosen for being crossed by a side-cut; and to keep up the water to a sufficient height for navigation in the upper part of the river, a dam or weir is thrown across the old river course, at or rather a little below the upper point at which the artificial cut joins it. The lock is then built at the most convenient part of the cut, generally near the upper end; and its fall or lift is made equal to the difference in the levels of the water at the top of the dam or weir, and in that at the lower end of the cut. But it may happen, that, owing to some rock or other natural obstruction in the river, no artificial dam will be required; and, on the other hand, it is probable that the fall of the river may be so great that several locks will be required in the same cut.

Of the impropriety of placing locks in a rapid current, a remarkable instance may be mentioned in the case of the locks which Polhem, a Swedish engineer, fearlessly attempted, in 1755, to place in the cataracts of Tröllhaetta, in the river Gotha, but which were wholly swept away by a flood, after they had been considerably advanced, and vast sums expended upon them.

In estimating the propriety of deepening shallows in any river, it must be of importance to take into consideration the nature of the shoals. If they have been created by deposits collected by the action of the current, it may be inferred that the same process will continually tend to the same results, and that any efforts to preserve the channel clear will require to be perpetual and laborious; but if the obstructions have been artificially made, or consist of a natural and solid substratum, it may be reasonable to presume that the excavations once made will either be permanent, or, at all events, be easily maintained.

Regarding the main question, whether the free and natural flow of the floods is to be arrested by locks, dams, and other works, the principles which have guided the operations of different engineers have been various and contradictory; but, in general, the practice has been to confine the freshes by artificial works, as in the Clyde, Witham, and other rivers, and to preserve the basins, or other receptacles for tidal waters, to their full extent. A contrary proceeding has tended to ruin many rivers and estuaries, and consequently to impede the drainage and navigation in a great degree, and to occasion the destruction of several harbours, such as those of the Dee and Rye. The effects of embankments in Plymouth and Portsmouth harbours, and particularly in the estuary of the Mersey, one third of the ancient capacity of which has been filled up by encroachments, have materially diminished the depths of the sea-channels, and a consequent deterioration of the harbours has been the result.

Where the navigation of a river is impeded by its waters being too much spread, or occupying too wide a channel, this may be remedied by contracting it by embankments, which will have the effect of increasing the depth of the stream, whether it scour out the bottom so as to lower it or not. Such is the usual mode of forming inland navigations in China. It has the advantage of being more speedy than passing through locks, and, indeed, rather too speedy to be safe for vessels in descending. A great power is, in some such cases, required to make a vessel ascend through the contraction. This is accomplished in a variety of ways; often by men aided by capstans; in other cases by machinery, such as a mill being at hand, which may be employed for towing up the vessel, while its weir

Navigation,
Inland.

Navigation,
Inland.

Improvements on
the Rhine.

or dam may, besides, be useful in prolonging the navigation of the river considerably farther up.

A splendid example of some of the more recent operations in the management of rivers is to be found in those of M. de Fontaine on the Rhine.¹ Near Emmerik the Waal branches off from the Rhine, so as to form two nearly equal rivers, each of which has its bed almost as large as that of the whole river; and when the waters rise, they are at an equal height in both. The Rhine divides itself again, towards Arnheim to form the Issel, which has nearly the same section as the Rhine. The first division of all the waters of this river was begun under the Roman generals, Drusus and Corbulo; and many subdivisions were made in subsequent ages. But such a multiplicity of channels, although productive of advantages to Holland, led to many fatal consequences. The waters being so much subdivided, lost the rapidity and strength necessary to push forward the alluvial matter, which being therefore deposited, occasioned a continual rising of the bottom, rendered the drainage of the adjacent lands more difficult, increased the expense of the embankments, and augmented the damages over the extensive lands when the dikes happened to break. The irregularity of the course of the Rhine, and the ravages which it constantly committed on its shores, particularly those of Alsace, one of the most fertile provinces of France, rendered the construction of defensive works imperative; and in 1820 M. de Fontaine was selected to perform this important task. The part of the Rhine to which he principally directed his attention is comprised between Basle and Neuburg, that being the political limit between France and the German states. In this part, the bed of the river is situated in the alluvium which forms the bottom of the valley; and through this the Rhine forces its way by many channels, forming, in its passage, islands and sand-banks, which render its motions very irregular both in times of high and low water. Amongst the different streams there is generally one more considerable than the others, and which forms the navigable channel. These branches are annually diminished by artificial works, and probably in a few years the whole of the waters of the Rhine will be forced into one channel, which may then be expected to become so much deeper, and freer from obstructions, as to be far more fit for navigation.

To enable vessels to ascend a rapid in a river, a powerful though rather tedious method, called warping, has been long in use. This consists in attaching or making fast one end of a rope somewhere up the rapid, and then winding up the other by means of a windlass or capstan on board, till the vessel ascends against the stream. Sometimes a tug-boat in constant attendance at the rapid is provided with two paddle-wheels, one on each side, which, turning by the force of the stream, wind up the rope on their axle, and enable the tug itself not only to ascend the torrent, but also to draw up other vessels after it. This method is probably at least a century old, being described in the *Machines Approuvées par l'Académie des Sciences*; but within the last twenty years it has been repeatedly announced as a wonderful discovery just made, sometimes here and sometimes in America. This shows the importance of diffusing knowledge, to save ingenious men from uselessly wasting their time in re-inventing what is already well known. Sometimes a paddle-wheel stationed somewhere up the rapid winds up the rope, and draws the vessel to it, which we should think by much the better method. Where the navigation of a river is incommoded by shifting mud or sand, the force of the current is sometimes employed, particularly in France, to urge forward a plank held on edge across the stream, so as to make it clear the

way like a snow-plough for a fleet of boats, &c. which are to follow. But it is more systematic to have a boat provided with flaps or wings for cleaning a river.

Navigation,
Inland.

BRIDGES.

Where canals or rivers are navigated only by such boats as have neither masts nor rigging, the bridges over these waters are, for the most part, fixed, and have scarcely anything peculiar in them on account of the navigation, except that the arch may rise a little higher, and have a towing-path under it, as shown at B, fig. 8, Plate CCCLXXIX. But a moveable bridge is always employed where a fixed one would occasion too great a rise in a road, or where the arch cannot be elevated sufficiently to clear the masts of vessels. There are several sorts of moveable bridges.

The draw or lift-bridge AA, fig. 8, is one which is fastened with a joint or hinges at one end, so that the other end may be lifted or let down by some easy artifice. Formerly this sort of bridge was lifted and suspended by chains and levers working in a huge wooden frame, which was often of great height, and usually painted in gaudy colours, to the great terror of such horses and other animals as were unaccustomed thereto. Some of these were long to be seen on the Forth and Clyde Canal. But such bridges are now generally lifted, without chains or levers, by turning a pinion which works into a toothed-rack fixed upon the bridge; or, if the bridge is large, it has two of these racks and pinions. This simplification of drawbridges is said to have originated with M. Perronet in France. For small canals a drawbridge consists of one leaf or frame only; but for entrances to docks and harbours, and for large canals, such as that of the Forth and Clyde, it is made in two halves, which meet in the middle when they are shut or let down. Such bridges, however, have been found inconvenient in practice, from their being apt to catch the yards and rigging of vessels in passing through them.

This inconvenience has given rise to a different form of moveable bridge, which, instead of lifting, like the former, round a horizontal axis, swings or turns horizontally, as it were, round a vertical axis; but the weight of this bridge is not supported on the centre or axis, but rests and is poised upon a circular series of balls or rollers surrounding the centre of motion. Some of the earliest of these bridges were principally made of wood, and for small canals consisted of a single leaf only; but they are now commonly made of cast iron, and, when large, are double. Fig. 1 shows an elevation, and fig. 2 a plan, of a double bridge of this sort, by the late Mr Ralph Walker, where AA is the line of the roadway, RR the rollers and lower ring, shown separately in fig. 6, with the outer ring to which they are attached. The upper ring is seen in fig. 4. Fig. 5 is a vertical section of the bridge through the centre of the rings, supposing the bridge and building to be laid on their side, and the section to be made across the roadway. In fig. 7, F is a vertical section of the abutment, while E is the upper side of the cross for the pivot, round which either half of the bridge turns. Fig. 3 shows a section of the part of the bridge to which is attached the pinion, which, by working in the fixed segment by means of the handle H, turns either half of the bridge quite out of the way of vessels passing along the river or canal, and also brings it back or shuts it again. GG are holes for putting in pins for locking the bridge. When the bridge is shut, three of the five ribs bear at right angles on the abutments; the other two are secured upon the upper circles, and at GG. We should think that a far

¹ Fontaine, *Des Travaux du Fleuve du Rhin*, 1833; and Mr Rennie's Report on Hydraulics.

Navigation,
Inland.

more simple bridge of the moveable sort might be formed, so as to move backwards and forwards in a straight line, like a waggon on a railway. Some rude bridges upon this principle are said to have been long in use in China.

BOATS.

Boats formed exclusively for canals are much longer and narrower than those which are also intended for rivers, or for river navigation alone. It is found, that when made of this shape, they are tracked with more ease or speed than when of a wider and shorter form; and they likewise occasion less injury to the sides of the canal. Indeed the proportions of the boats must always be regulated by the dimensions of the locks and bridges; and these have often been made of very reduced width, from considerations of economy in the construction. In the central districts of England, the boats are without masts. They are generally sharp at both ends, having no projecting stern, but being guarded by three rows of wrought-iron bands, which extend round the bows to the distance of twenty feet on each side, above and below the water line. The bottom is nearly flat, but they are generally encumbered with a keel, which is of no use in a canal but to require a greater depth of water. Keels sufficiently heavy, it is true, may act as ballast, but that would not compensate for the other inconvenience. Where very long boats would not have room to turn, several short ones are linked together in a string; one horse drawing these more easily than a single boat of great breadth, which, besides, might not have room to pass through the locks. The boats of the Mersey and Irwell Navigation Company are provided with masts and sails, such that they can coast round the whole island; and they are capable, too, of contending with the most boisterous weather. Their masts are made to strike by means of a forestay attached to two double-sheaved blocks, one of which is firmly fixed to the top of the stem; and the stay is heaved down by a windlass on the forepart of the deck. The boom extends no farther out than the after extremity of the rudder, and the stern is made nearly vertical. Vessels similar to these, especially in having a falling mast to pass under bridges, are much employed on the Thames and other rivers.

Oars, no doubt, in some shape or other, formed at an early period a means of propelling vessels on inland waters, and are still in use for that purpose. Sails, too, are employed on lakes and in the wider parts of rivers, if the current is moderate, with sufficient room for tacking; and during a favourable wind almost all vessels which may, on any account, be provided with sails, are in the habit of hoisting them when on a narrow river or canal. But in the latter cases the most usual method is to track or draw the vessels along by the power of men or horses travelling on the banks. The practice of men tracking boats is probably very ancient, and is still the mode in China and other barbarous or obscure places, where vast numbers of men continue to be thus employed. Nay, to come nearer home, it was even continued on the Thames and the Severn till near the end of last century, when proper towing paths and horses were, for the first time, introduced on these rivers, as they had been long before on canals.

But the most efficient power hitherto employed for propelling vessels, either in still water or against a moderate current in a large river, is that of steam, which has now come into general use for that purpose; though it certainly

acts at a prodigious disadvantage, by re-acting against water which it is either leaving or which is moving from it,—a disadvantage, too, which augments with the rate of sailing. For this reason, and on account of the force which is wasted by the paddle-boards in entering and quitting the water with great velocity, and which waste also increases with the velocity of the paddles, it follows that the force of the steam-engine must be greatly increased, to occasion such an increase in the re-action of the paddles as shall urge the vessel with any considerably greater rapidity. Such seem to be some of the reasons why we often hear of a vessel being propelled by a power equal to that of 500 or 600 horses, while there is not the least probability that it is encountering a resistance of one fifth so much.

Of late years a great many experiments have been made on the trackage and resistance of canal-boats, particularly by Mr Palmer, Mr Macniell, and Mr Russell; but their results, though interesting, are very discordant. Mr Palmer makes the resistance as the cube of the velocity, which would be fatal altogether to any thing in the shape of swift boats. Mr Macniell, again, makes the most advantageous velocity about nine or ten miles per hour, which is nearly what has been in use, and found to answer so well for several years with light boats carrying passengers on different canals, as we shall presently notice more particularly. But Mr Russell carries the most advantageous velocity so very high, if indeed he gives it a limit, that, even granting his experiments to be perfectly correct, we have great doubts whether such velocities can ever be applicable to any practical purpose, at least of the nature of a long navigation.

Light boats for conveying passengers with a speed formerly unknown upon canals, were first introduced by Mr Houston, in June 1831, on the Glasgow and Paisley Canal.¹ The following account of its success, after a two years' trial, is given by Mr Thomas Grahame, civil engineer, in his Letter to Canal Proprietors and Traders. "The ordinary speed for the conveyance of passengers on the Ardrossan Canal has, for nearly two years, been from nine to ten miles an hour; and although there are fourteen journeys along the canal per day at this rapid speed, its banks have sustained no injury. The boats are seventy feet in length, about five feet and a half broad, and, but for the extreme narrowness of the canal, might be made broader. They carry easily from seventy to eighty passengers; and, when required, can and have carried upwards of 110 passengers. The entire cost of a boat and fittings up is about L.125. The hulls are formed of light iron plate and ribs, and the covering is of wood and light oiled cloth. They are more airy, light, and comfortable, than any coach. They permit the passengers to move about from the outer to the inner cabin; and the fares per mile are one penny in the first, and three farthings in the second cabin. The passengers are all carried under cover, having the privilege also of an uncovered space. These boats are drawn by two horses, the prices of which may be from L.50 to L.60 per pair, in stages of four miles in length, which are done in from twenty-two to twenty-five minutes, including stoppages to let out and take in passengers, each set of horses doing three or four stages alternately each day. In fact, the boats are drawn through this narrow and shallow canal at a velocity which many celebrated engineers had demonstrated, and which the public believed, to be impossible."

Swift boats have likewise been for several years in use on the Forth and Clyde Canal, the Edinburgh and Glas-

Navigation,
Inland.

¹ A small boat closely covered in is by no means free from danger on a deep canal; for if by accident or mismanagement it were allowed to sink, it would be very apt to confine the inmates under water till they were drowned, especially as those who become frantic would prevent the more sober from escaping.

Navigators' Islands.

gow Union Canal, the Lancaster Canal, and on various others, with equal success, at least between locks, or wherever they are free from locks. There is, however, little reason to expect, as some seem to do, that any material increase of swiftness above that now described is likely ever to be effected with advantage on ordinary canals. Horses have already been pushed to their utmost speed; and were steam introduced, with all its machinery and apparatus, the weight would be so enormously augmented as to require a prodigious increase of moving power. But, on several other accounts, the ordinary canals, and almost every thing connected with them, are totally unfit for a much greater velocity. Swifter boats would require canals to be interrupted by no locks, to have no contractions at tunnels and bridges, and to be incommoded by no barges or other slow and heavy craft, which cannot instantly be cleared out of the way. Drawbridges would be attended with a similar inconvenience. The slightest covering, even of broken ice, would occasion a serious resistance; whilst intense frost, which has no effect upon railways, arrests boats altogether. The Americans, it is true, pretend to have greatly outstripped us in swiftness; but it is fully as easy to read some of their statements on this head as to give them entire credit. There can be no question that it is easier to propel a boat more speedily along a great river like the Hudson, than in our narrow and shallow canals, where much time is lost in passing through the locks, or great inconvenience is experienced in conveying the cargo from one boat to another, past the locks.

The swiftest boat would take almost the same time to pass through a lock as the most tardy and unwieldy barge; and it would be difficult, and even hazardous, from the risk of striking against the ends of the building, to force it swiftly through, and especially to make it enter a narrow tunnel, or the narrow contractions at bridges or aqueducts. On these accounts, and the perpetual risk of running foul of other craft, the pilotage of a very swift boat is a task with which few could be intrusted, or rather for which no one is competent. These, however, are difficulties and dangers with which railways have not necessarily any thing to do; because the railway itself acts as the most perfect pilot. In short, to think, as some do, that, at this age of the world, canals can ever be brought to compete with railways in point of swiftness, is a project which cannot be listened to by any disinterested person who is sufficiently informed on such subjects.

On the other hand, although the kind of traffic on which canals have hitherto depended principally for their support is not likely to be withdrawn from them by the competition of railways, as appears from the canal business be-

tween Liverpool and Manchester having increased since the railway came into operation, yet it is not so easy to quiet the fears of those who are more immediately concerned; and those who do give way to such fears put themselves in the way of being ridiculously imposed upon. Accordingly, a few years ago, a pamphlet was most industriously circulated throughout England, with the view of setting forth the great superiority of canals over railways, and also of showing what a most ruinous speculation the Liverpool and Manchester Railway had been. Such assertions, however, met with a speedy refutation; and, in some discussion which arose on the subject, the author of the pamphlet let out that he had been hired on purpose, and also, what is curious, that his reward was not simply derived from proprietors of coaches and canals, but that one of our great seminaries of religion and learning had liberally afforded him its share of support.

The following is a list of works to which we have either been indebted in drawing up the preceding pages, or at least from which much farther information may still be obtained; though these, after all, form but a small proportion of the works which treat more or less on subjects relating to inland navigation:—Belidor, *Architecture Hydraulique*; Lalande, *Traité des Canaux de Navigation*; Frisi, *de Canali Navigabili*; Phillips' *History of Inland Navigation*; Fulton on *Canal Navigation*; Chapman's *Observations on Canals, &c.*; Leach on *Inland Navigation*; Anderson's *Recreations*; Smeaton's *Reports on Civil Engineering*; Nicholson's *Philosophical Journal*; Telford's *Reports on the Caledonian Canal*; Strickland's *Reports on Canals, Railways, &c.*; Cox's *Travels in the North of Europe*; Barrow's *Travels in the North of Europe*; *Transactions of the Society of Civil Engineers*; *Transactions of Statistical Society*; M'Culloch's *Commercial Dictionary*; M'Culloch's *Statistics of the British Empire*; Martin's *History of the British Colonies*; *Journal of the Royal Geographical Society*; Dupin's *Commercial Power of Great Britain*; Rennie on *Hydraulics*, in the *Reports of the British Association*; Fairbairn on *Canal and Steam Navigation*; Macniell on the *Resistance of Water, &c.*; Priestley's *Account of Canals, &c. in Britain*; Hamilton's *East India Gazetteer*; Girard, *Mémoires sur les Canaux, &c.*; Huerne, *Des Canaux Navigables*; Dutens, *Histoire de la Navigation Intérieure de la France*; Dutens sur les *Travaux Publics d'Angleterre*; Warden's *Account of the United States of America*; Pitkin's *Statistics of the United States*; Flint's *Geography of the Western States*; the *American Almanac*; the *Franklin Journal*; *Mechanics' Magazine*; *Railway Journal*; *Edinburgh Philosophical Journal*; *Edinburgh Review*; Balbi, *Abrégé de la Géographie*; *Tableau des Etats Danois, &c.* (E. E. E.)

Navigators' Islands.

NAVIGATORS' ISLANDS, a group of islands in the Southern Pacific Ocean, remarkable for their extent, fertility, and population. They are about ten in number, and are situated between 169. and 172. 30. west longitude, and from latitude 13. 25. to an uncertain boundary southward. When seen from the ocean they present a lofty appearance, and are mountainous, but neither surrounded with a low border nor enclosed by reefs, like the Society Islands. The first discovery of these islands was made in 1722, by Roggewein and Bauman, who fell in with the easternmost of the number; whilst Bougainville, in 1768, added another; and Prowse, in 1787, discovered the two westernmost, which are the largest, being more than forty miles in length. The last navigator was informed of three more to the southward. The whole group was visited in 1791 by Captain Edwards. The inhabitants are a stout and well-made race, of the ordinary height of five feet nine or eleven inches. They are altogether savage in their manners, which

are said to be remarkably profligate and indecent. They are also of the most ferocious dispositions. The least dispute between them is followed by blows from clubs, sticks, or paddles, and is often attended with the loss of life. They are very ingenious, and fashion their work dexterously with hatchets shaped like adzes, and made of very fine and compact basalts. With these they finish works in wood, and give them so high a polish that they appear to be coated with the finest varnish. They also manufacture a species of cloth which possesses great strength and pliability, and is well calculated for the sails of canoes. The name of Navigators' Islands was bestowed by Bougainville, from the practice which prevails amongst the inhabitants of continually travelling in canoes. We have no data upon which we can calculate the amount of the population; but it must be considerable, considering that these islands are amongst the largest and most fertile in the South Seas.

N A V Y.

Navy.

AN insular empire, like that of the united kingdom of Great Britain and Ireland, which is so much indebted, and always must be, for that power, prosperity, and renown which she enjoys, to the glorious deeds of her navy, cannot but take a peculiar degree of interest in every thing that concerns it. This vast machine, indeed, has at all times been the pride and boast of Great Britain, the terror of its enemies, and the admiration of the world. It is under the impression of its vast importance that we have been induced to give, under their proper heads, such details of the civil and military branches of the naval departments as may afford, without entering into too minute details, a comprehensive sketch of this great national bulwark, of which it is now proposed to take a general view.

The term NAVY is generally intended to express all ships of commerce as well as those of war, the mercantile as well as the military marine; but the observations contained in the present article are meant to relate only to the latter, excepting that, in speaking of the progressive enlargement of ships, and improvements in naval architecture, the remarks may sometimes equally apply to ships of commerce and of war.

NAVY composed of MATERIEL and PERSONEL.

The composition of a navy may be considered under the two distinct heads into which it naturally divides itself, and under which the French generally distinguish an army, the *matériel*, and the *personel*; the former embracing every thing that appertains to the ships, their capacity, construction, armament, and equipment; the latter all that concerns the rank, the appointment, the various duties, &c. of the officers, seamen, and marines.

I.—MATERIEL OF THE NAVY.

History.

It would occupy too large a space to give even a short sketch of the origin and the progress of naval architecture, from a bundle of branches, or the hollow trunk of a tree—the rude raft and the frail canoe—to the more perfect coracle, or the wicker-boats of the ancient Britons, covered with hides. For many centuries after the expulsion of the Romans from, or their abandonment of, the British Islands, very little progress appears to have been made by us in the art of navigation or ship building: the natives would appear, for many centuries afterwards, to have acted merely on the defensive against naval invasions.

“The whole of our naval history,” say the commissioners for revising the civil affairs of the navy, “may be divided into three periods; the *first* comprehending all that preceded the reign of Henry VIII.; the *second* ending with the restoration of Charles II.; and the *third* coming down from the Restoration to the present day.”

First period.

To what size, and to what extent, the amount of the English ships or vessels were carried, which supported so many contests with the invading Danes in the ninth century, our naval history has not preserved any record. We are told, however, that Alfred increased the size of his galleys, and that some of them were capable of rowing thirty pair of oars. These galleys were chiefly employed in clearing the Channel of the nests of pirates by which it was infested. It is also said, as a proof of his attention to naval matters, that, under his auspices, one Ochter under-

took a voyage into the arctic regions, made a survey of the coasts of Lapland and Norway, and brought to Alfred an account of the mode pursued by the inhabitants of those countries to catch whales. It is, moreover, on record, that his two sons, Edward and Athelstan, fought many bloody actions with the Danes, in which several kings and chiefs were slain; and that Edgar had from three to five thousand ships, divided into three fleets, stationed on three several parts of the coast, with which, passing from one fleet or squadron to the other, he circumnavigated the island; that after this he called himself “Monarch of all Albion, and Sovereign over all the adjacent Isles.” Some notion, however, may be formed of the size of the vessels which composed his fleets, from the imposition of a land-tax, which required certain proprietors to furnish a stout galley of three rows of oars, to protect the coast from the Danish pirates. The more effectually to check these marauders, and protect the coasts of the kingdom, William the Conqueror, in 1066, established the Cinque Ports, and gave them certain privileges, on condition of their furnishing fifty-two ships, with twenty-four men in each, for fifteen days, in cases of emergency. We should not, perhaps, be far amiss in dating the period of our naval architecture from the Conquest. “The Normans,” says Sir Walter Raleigh, “grew better shipwrights than either the Danes or Saxons, and made the last conquest of this land; a land which can never be conquered whilst the kings thereof keep the dominion of the seas.” But Raleigh does not describe what the ships were which the Normans taught us to build; nor can it now be known in what kind of vessels William transported his army across the Channel, or what was the description of the hundred large ships and fifty galleys of which the naval armament of Richard I. consisted on his expedition to the Holy Land. We are told, however, that having increased his fleet at Cyprus to two hundred and fifty ships and sixty galleys, he fell in with a ship belonging to the Saracens, of such an extraordinary size that she was defended by 1500 men, all of whom, with the exception of 200, Richard, after taking possession of her, ordered to be thrown overboard and drowned.

There can be no doubt that the nations of the Mediterranean, particularly the Genoese and Venetians, introduced many improvements as to the capacity and stability of their ships, in consequence of the crusades, and the demands for warlike stores and provisions which such vast and ill-provided armies necessarily created; but these improvements would seem not to have reached, or, at least, to have made but a tardy progress in, Great Britain. King John, it is true, stoutly claimed for England the sovereignty of the sea, and decreed that all ships belonging to foreign nations, the masters of which should refuse to strike to the British flag, should be seized and deemed good and lawful prize. And this monarch is said to have fitted out no less than five hundred sail of ships, under the Earl of Salisbury, in the year 1213, against a fleet of three times that number, prepared by Philip of France for the invasion of England; of which the English took three hundred sail, and drove a hundred on shore, Philip being under the necessity of destroying the remainder, to prevent their falling also into the hands of the English. Of the kinds of ships of which his fleet consisted, some notion may be formed by the account that is related of an action fought in the following reign with the French, who, with “eighty stout ships,” threatened the coast of Kent. This fleet being discovered by Hubert de Burgh, governor of Dover Castle, he put to sea with forty English ships, and having got to

Matériel.

Matériel. the windward of the enemy, and run down many of the smaller ships, he closed with the rest, and threw on board them a quantity of quicklime, which blinded them so effectually that all their ships were either taken or sunk.

Whatever the size and the armaments of our ships were, the empire of the sea was bravely maintained by the Edwards and the Henrys in many a gallant and glorious sea-fight with the fleets of France, against which they were generally opposed with inferior numbers. The temper of the times, and the public feeling, were strongly exemplified in the reign of Edward I. by the following circumstance: An English sailor was killed in a Norman port, in consequence of which a war commenced, and the two nations agreed to decide the dispute on a certain day, with the whole of their respective naval forces. The spot of battle was to be the middle of the Channel, marked out by anchoring there an empty ship. The two fleets met on the 14th April 1293; the English obtained the victory, and carried off above two hundred and fifty sail.

In an action with the French fleet off the harbour of Sluys, Edward III. is said to have slain 30,000 of the enemy, and to have taken two hundred great ships, "in one of which only, there were four hundred dead bodies." This is no doubt an exaggeration. The same monarch, at the siege of Calais, is stated to have blockaded that port with seven hundred and thirty sail, having on board 14,956 mariners; twenty-five only of which were of the royal navy, bearing four hundred and nineteen mariners, or about seventeen men each. In various other sea actions did this great sovereign nobly support the honour of the British flag. But though we then, and ever after, claimed the "dominion of the seas," that dominion, says Raleigh, "was never absolute until the time of Henry the Eighth." It was a maxim of this great statesman, that "whosoever commands the sea, commands the trade of the world; whosoever commands the trade, commands the riches of the world, and consequently the world itself."

The reign of Henry V., however, was most glorious in maintaining the naval superiority over the fleets of France. From a letter of this sovereign to his lord chancellor, dated 12th August 1417, discovered by the late Mr Lysons among the records in the Tower, and of which the following is a copy, it would appear that there was something like an established royal navy in his reign, independently of the shipping furnished by the Cinque Ports and the merchants, for the king's own use, on occasion of any particular expedition. The letter appears to have been written nine days after the surrender of the castle of Touque in Normandy, from whence it is dated.

*"Au révérend pere en Dieu l'Evesque de Duresme nre
Chancellor d'Engleterre.*

"Worshipful fader yn God We sende you closed within this letter a cedula conteyning the names of certein Maistres for ovr owne grete Shippes Carrakes Barges and Ballyngers to the whiche Maistres We have granted annuities such as is appointed upon eche of hem in the same Cedula to take yerely of owre grante while that us lust at ovr Exchequer of Westm^r. at the termes of Michelmasse and Ester by even porcions. Wherefore We wol and charge yow that unto eche of the said Maistres ye do make under ovr grete seel beyng in yowre warde ovr letters patentes severales in due forme after th'effect and pourport of ovr said grante. Yeven under ovr signet atte ovr Castle of Touque the xij. day of August."

Extract from the Schedule contained in the preceding Letter.

vj. li. xiijs. iiijd. La Grande Nief ap- pellee the dont John William est Maistre	vj. Mariners po ^r la sauf garde deink Hamult.
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vj. li. xiijs. iiijd. La Trinite Royale dont Steph ^r Thomas est Maistre	vj. Mariners.
vj. li. xiijs. iiijd. La Holy Gost dont Jordan Brownyng est Maistre	vj. Mariners.
vj. li. xiijs. iiijd. La Carrake appellee le Petre dont John Gerard est Maistre	vj. Mariners.
vj. li. xiijs. iiijd. La Carrake appellee le Paul dont William Payne est Maistre	vj. Mariners.
vj. li. xiijs. iiijd. La Carrak appelle le Andrewe dont John Thor- nyng est Maistr ^r	vj. Mariners.
vj. li. xiijs. iiijd. La Carrak appellee le Xpofre dont Tendrell est Maistr ^r	vj. Mariners.
vj. li. xiijs. iiijd. La Carrak appelle le Marie dont William Riche- man est Maistr ^r	vj. Mariners.
vj. li. xiijs. iiijd. La Carrak appellee le Marie dont William Hethe est Maistre	vj. Mariners.
vj. li. xiijs. iiijd. La Carrak appelle le George dont John Mersh est Maistr ^r	vj. Mariners.

The remainder, to the masters of which pensions were thus granted, consist of seventeen "niefs, barges, and ballyngers," some with three, and others two mariners only. But history informs us, that about this time Henry embarked an army of 25,000 men at Dover on board of 1500 sail of ships, two of which carried purple sails, embroidered with the arms of England and France; one styled the King's Chamber, the other his Saloon, as typical of his keeping his court at sea, which he considered as a part of his dominions. Still we are left in the dark as to the real dimensions of his ships, and the nature of their armament; they were probably used only as transports for his army. It would appear, however, from a very curious poem, written in the early part of the reign of King Henry VI. that the navy of his predecessor was considerable, but that, by neglect, it was then reduced to the same state in which it had been during the preceding reigns. The poem here alluded to is entitled "The English Policie, exhorting all England to keep the Sea, and namely the Narrow Sea; showing what profit cometh thereof, and also what worship and salvation to England and to all Englishmen;" and is printed in the first volume of Hackluyt's Collection of Voyages. It was evidently written before the year 1438, when the Emperor Sigismond died, as appears by the following passage in the prologue:

For Sigismond, the great Emperour,
Which yet reigneth, when he was in this land,
With King Henry the Fifth, Prince of Honour,
Here much glory, as him thought, he found
A mightie land, which had take in hand
To werre with France, and make mortalitie,
And ever well kept round about the sea.

The part of the poem which alludes to the navy of King Henry V. is entitled "Another incident of keeping the Sea, in the time of marvellous werriour and victorious Prince, King Henrie the Fifth, and of his great Shippes."

The following are the most remarkable passages:

And if I should conclude all by the King
Henrie the Fift, what was his purposing,
Whan at Hampton he made the great *dromons*,
Which passed other great ships of the Commons;
The *Trinitie*, the *Grace de Dieu*, the *Holy Ghost*,
And other moe, which as now be lost.
What hope ye was the Kings great intent
Of thoo shippes, and what in mind he meant:
It was not ellis, but that *he cast to bee*
Lorde round about environ of the see.
And if he had to this time lived here,
He had been Prince named withouten pere:

Matériel.

Matériel.

His great ships should have been put in preefe,
 Unto the ende that he ment of in chiefe.
 For doubt it not but that he would have bee
 Lord and master about the round see :
 And kept it sure, to stoppe our ennemies hence,
 And wonne us good, and wisely brought it thence,
 That no passage should be without danger,
 And his licence on see to move and sterre.

Shortly after the time when this poem must have been written, it appears from the parliament roll (20th Henry VI. 1442), that an armed naval force, consisting only of eight large ships, with smaller vessels to attend them, was to be collected from the ports of London, Bristol, Dartmouth, Hull, Newcastle, Winchelsea, Plymouth, Falmouth, &c.; and, of course, the royal ships of 1417, the names of which are contained in the foregoing schedule, were then either gone to decay or dispersed. We are not to judge of the size of these ships from the few mariners appointed to each. These were merely the ship-keepers, or harbour-duty men, placed on permanent pay, to keep the ships in a condition fit for the sea when wanted.

It is very probable that, until our merchants engaged in the Mediterranean trade, and that the attention of the government was turned, in the reign of Henry VII. (about 1496), to imitate Portugal in making foreign discovery, under the skilful seaman Sebastian Cabot, very little was added to the capacity or the power of British ships of war. It is said, however, that on the accession of Henry VII. to the throne in 1485, he caused his marine, which had been neglected in the preceding reign, to be put into a condition to protect the coasts against all foreign invasions; and that, in the midst of profound peace, he always kept up a fleet ready to act. In his reign was built a ship called the Great Harry, the first on record that deserved the name of a ship of war, if it was not the first exclusively appropriated to the service of the state. This is the same ship which Camden has miscalled the Henry Grace de Dieu, and which was not built till twenty years afterwards, under the reign of Henry VIII. The Great Harry is stated to have cost L.14,000, and was burned by accident at Woolwich in the year 1553.

Second
Period.

We now come to that period of our naval history in which England might be truly said to possess a military marine, and of which some curious details have been left us by that extraordinary man of business Mr Pepys, a commissioner of the navy, and afterwards secretary to Charles II., at a time when the king executed in person the office of lord high admiral, and also to James II. until his abdication. His minutes and miscellanies relative to the navy are contained in a great number of manuscript volumes, which are deposited in the Pepysian Library in Magdalene College, Cambridge. From these papers it appears, that in the thirteenth year of Henry VIII. the following were the names and the tonnage of the royal navy :

	Tons.
Henry Grace de Dieu.....	1500
Gabriel Royal.....	650
Mary Rose.....	600
Barbara.....	400
Mary George.....	250
Henry Hampton.....	120
The Great Galley.....	800
Sovereign.....	800
Catherine Forteleza.....	550
John Baptist.....	400
Great Nicholas.....	400
Mary James.....	240
Great Bark.....	250
Less Bark.....	180

Add to these two row-barges of sixty tons each, making,

in the whole, sixteen ships and vessels, measuring 7260 Matériel. tons.

The Henry Grace de Dieu is stated in all other accounts, and with more probability, to have been only 1000 tons; the rule for ascertaining the measurement of ships being still vague, and liable to great error, was probably much more so at this early period. This ship was built in 1515, at Erith, in the river Thames, to replace the Regent, of the same tonnage, which was burned in August 1512, in action with the French fleet, when carrying the flag of the lord high admiral. There is a drawing in the Pepysian papers of the Henry Grace de Dieu, from which a print in the *Archæologia* has been engraved, and of which a copy has been taken as a frontispiece to Mr Derrick's *Memoirs of the Rise and Progress of the Royal Navy*. From these papers it appears that she carried fourteen guns on the lower deck, twelve on the main deck, eighteen on the quarter-deck and poop, eighteen on the lofty fore-castle, and ten in her stern-ports, making altogether seventy-two guns. Her regular establishment of men is said to have consisted of 349 soldiers, 301 mariners, and fifty gunners, making altogether 700 men. Some idea may be formed of the awkwardness in manœuvring ships built on her construction, or similar to her, when it is stated that, on the appearance of the French fleet at St Helens, the Great Harry, built in the former reign, and the first ship built with two decks, had nearly been sunk; and that the Mary Rose, of 600 tons, with 500 or 600 men on board, was actually sunk at Spithead, occasioned, as Raleigh informs us, "by a little sway in casting the ship about, her ports being within sixteen inches of the water." On this occasion the fleets cannonaded each other for two hours; and it is remarked as something extraordinary, that not less than three hundred cannon-shot were fired on both sides in the course of this action. From the prints above mentioned, which agree very closely with the curious painting of Henry crossing the Channel in his fleet to meet Francis on the *Champ de Drap d'Or*, near Calais, and now in the great room where the Society of Antiquaries hold their meetings in Somerset House, it is quite surprising how they could be trusted on the sea at all, their enormous poops and fore-castles making them appear loftier and more awkward than the large Chinese junks, to which, indeed, they bear a strong resemblance. It is worth remarking, that, two years ago, the position of the Mary Rose, near Spithead, was pointed out to that extraordinary diver Mr Deane, who went down several times, and brought up some beautiful pieces of brass ordnance, as perfect and as fine specimens as any we have at the present day.

Henry VIII. may justly be said to have laid the foundation of the British navy. He established the dock-yards at Deptford, Woolwich, and Portsmouth; he appointed certain commissioners to superintend the civil affairs of the navy, and settled the rank and pay of admirals, vice-admirals, and inferior officers; thus creating a national navy, and raising the officers to a separate and distinct profession. The great officers of the navy then were, the vice-admiral of England, the master of the ordnance, the surveyor of the marine causes, the treasurer, comptroller, general surveyor of the victualling, clerk of the ships, and clerk of the stores. Each of these officers had their particular duties, but they met together at their office on Tower Hill once a week, to consult, and make their reports to the lord high admiral. He also established the fraternity of the Trinity House, for the improvement of navigation and the encouragement of commerce; and built the castles of Deal, Walmer, Sandgate, Hurst Castle, &c. for the protection of his fleet and of the coast.

At the death of Henry VIII. in 1547, the royal navy consisted of about fifty ships and vessels of different sizes, the former from 1000 to 150 tons, and the latter down to

Matériel. twenty tons, making in the whole about 12,000 tons, and manned by about 8000 mariners, soldiers, gunners, &c. In the short reign of his son Edward, little alteration seems to have taken place in the state and condition of the royal navy. But the regulations which had been made in the reign of his father, for the civil government of naval affairs, were revised, arranged, and turned into ordinances, which form the basis of all the subsequent instructions given to the commissioners for the management of the civil affairs of the navy. In the reign of Mary the tonnage of the navy was reduced to about 7000 tons; but her lord high admiral nobly maintained the title assumed by England of Sovereign of the Seas, by compelling Philip of Spain to strike his flag that was flying at the main-top-mast head, though on his way to England to marry Queen Mary, by firing a shot at the Spanish admiral. He also demanded that his whole fleet, consisting of 160 sail, should strike their colours and lower their top-sails, as an homage to the English flag, before he would permit his squadron to salute the Spanish monarch.

The reign of Elizabeth was the proudest period of our naval history, perhaps surpassed by none previously to the Revolution. She not only increased the numerical force of the regular navy, but established many wise regulations for its preservation, and for securing adequate supplies of timber and other naval stores. She placed her naval officers on a more respectable footing, and encouraged foreign trade and geographical discoveries, so that she acquired justly the title of the Restorer of Naval Power, and Sovereign of the Northern Seas. The greatest naval force that had at any previous period been called together was that which was assembled to oppose the Invincible Armada, and which, according to the notes of Mr Secretary Pepys, consisted of 176 ships, with 14,992 men; but these were not all "Shippes Royall," but were partly composed of the contributions of the Cinque Ports and others. The number actually belonging to the navy is variously stated, but they would appear to have been somewhere about forty sail of ships, manned with about 6000 men. At the end of her reign, however, the navy had greatly increased, the list in 1603 consisting of forty-two ships of various descriptions, amounting to 17,000 tons, and manned with 8346 men. Of these, two were of the burden of 1000 tons each, three of 900 tons, and ten from 600 to 800 tons.

James I. was not inattentive to his navy. He warmly patronised Mr Phineas Pett, the most able and scientific shipwright that this country ever boasted, and to whom we undoubtedly owe the first essential improvements in the form and construction of ships. The cumbrous top-works were first got rid of under his superintendence. "In my owne time," says Raleigh, "the shape of our English ships hath been greatly bettered; in extremity we carry our ordnance better than we were wont; we have added crosse pillars in our royall shippes, to strengthen them; we have given longer floors to our shippes than in older times," &c. The young Prince Henry was so fond of naval affairs, that Phineas Pett was ordered by the lord high admiral to build a vessel at Chatham in 1604, with all possible speed, for the young Prince Henry to disport himself in, above London Bridge; the length of her keel was twenty-eight feet, and her breadth twelve feet. In 1610 Pett laid down the largest ship that had hitherto been built. She was named the Prince Royal; her burden was 1400 tons, her keel 114 feet, and she was armed with sixty-four pieces of great ordnance, "being in all respects," says Stowe, "the greatest and goodliest ship that was ever built in England." He adds, "the great workmaster in building this ship was Mr Phineas Pett, gentleman, some time master of arts, of Emanuel College, in Cambridge."

This excellent man, as appears from a manuscript ac-

Matériel. count of his life in the British Museum, written by himself, was regarded by the shipwrights of the dock-yards, who had no science themselves, with an eye of jealousy; and a complaint was laid against him before the king, of ignorance in laying off a ship, and of a wasteful expenditure of timber and other matters. The king attended at Woolwich with his court, to inquire in person into the charges brought forward, and, after a painful investigation, pronounced in favour of Mr Pett. One of the charges was, that he had caused the wood to be cut across the grain; but the king observed, that, as it appeared to him, "it was not the wood, but those who had preferred the charges, that were cross-grained."

The state of the navy at the king's death is variously given by different writers; but on this subject the memoranda left by Mr Secretary Pepys are most likely to be correct. From them it appears that, in 1618, certain commissioners were appointed to examine into the state of the navy, and by their report it appears there were then only thirty-nine ships and vessels, whose tonnage amounted to 14,700 tons; but in 1624, on the same authority, the numbers had decreased to thirty-two or thirty-three ships and vessels, but the tonnage increased to about 19,400 tons. The commissioners had, in fact, recommended many of the small craft to be broken up or sold, and more ships of the higher rates to be kept up.

The navy was not neglected in the troublesome reign of Charles I. This unfortunate monarch added upwards of twenty sail to the list, generally of the smaller kind; but one of them, built by Pett, was of a description, both as to form and dimensions, far superior to any that had yet been launched. This ship was the celebrated Sovereign of the Seas, which was launched at Woolwich in 1637. The length of her keel was 128 feet, the main breadth forty-eight feet, and from stem to stern 232 feet. In the description of this ship by Thomas Heywood, she is said to have "bore five lanthorns, the biggest of which would hold ten persons upright; had three flush-decks, a fore-castle, half-deck, quarter-deck, and round-house. Her lower tier had thirty ports for cannon and demi-cannon; middle tier, thirty for culverins and demi-culverins; third tier, twenty-six for other ordnance; fore-castle, twelve; and two half-decks, thirteen or fourteen ports more within board, for murdering pieces; besides ten pieces of chace ordnance forward, and ten right aft, and many loop-holes in the cabins for musquet-shot. She had eleven anchors, one of 4400 pounds weight. She was of the burden of 1637 tons." It appears, however, that she was found, on trial, to be too high for a good serviceable ship in all weathers, and was therefore cut down to a deck less. After this she became an excellent ship, and was in almost all the great actions with the Dutch; she was rebuilt in 1684, when the name was changed to that of Royal Sovereign; and was about to be rebuilt a second time at Chatham in 1696, when she accidentally took fire, and was totally consumed. In this reign the ships of the navy were first classed, or divided into six rates, the first being from 100 to sixty guns, the second from fifty-four to thirty-six, &c.

In 1642 the management of the navy was taken out of the king's hands, and in 1648 Prince Rupert carried away twenty-five ships, none of which ever returned; and such, indeed, was the reduced state of the navy, that at the beginning of Cromwell's usurped government, he had only fourteen ships of war of two decks, and some of these carried only forty guns; but, under the careful management of very able men, in different commissions which he appointed, such vigorous measures were pursued, that, in five years, though engaged within that time in war with the greatest naval power in Europe, the fleet was increased to 150 sail, of which more than a third part had two decks, and many of which were captured from the Dutch, and

Matériel. upwards of 20,000 seamen were employed in the navy. Our military marine was, indeed, raised by Cromwell to a height which it had never before reached; but from which it soon declined under the short and feeble administration of his son.

Though Cromwell found the navy divided into six rates or classes, it was under his government that these ratings were defined and established in the manner nearly in which they now are; and it may also be remarked, that, under his government, the first frigate, called the *Constant Warwick*, was built in England. "She was built," says Mr Pepys, "in 1649, by Mr Peter Pett (son of Phineas), for a privateer for the Earl of Warwick, and was sold by him to the state. Mr Pett took his model of this ship from a French frigate which he had seen in the Thames."

During the first period of our naval history, we know nothing of the nature of the armament of the ships. From the time of Edward III. they might have been armed with cannon, but no mention is made of this being the case. According to Lord Herbert, brass ordnance were first cast in England in the year 1535. They had various names, such as cannon, demi-cannon, culverins, demi-culverins, sakers, mynions, falcons, falconets, &c. What the calibre of each of these was is not accurately known, but the cannon is supposed to have been about sixty-pounders, the demi-cannon thirty-two, the culverin eighteen, falcon two, mynion four, saker five, &c. Many of these pieces, of different calibres, were mounted on the same deck, which must have occasioned great confusion in action in finding for each its proper shot.

Third period.

On the restoration of Charles II. the Duke of York was immediately appointed lord high admiral, and by his advice a committee was named to consider a plan, proposed by himself, for the future regulation of the affairs of the navy, at which the duke himself presided. By the advice and able assistance of Mr Pepys, great progress was speedily made in the reparation and increase of the fleet. The duke remained lord high admiral till 1673, when, in consequence of the test required by parliament, to which he could not submit, he resigned, and that office was in part put in commission, and the rest retained by the king. Prince Rupert was put at the head of this commission, and Mr Pepys appointed secretary to the king in all naval affairs, and of the admiralty; and by his able and judicious management there were in sea-pay, in the year 1679, and in excellent condition, seventy-six ships of the line, all furnished with stores for six months, eight fire-ships, besides a numerous train of ketches, smacks, yachts, &c. with more than 12,000 seamen; and also thirty new ships building, and a good supply of stores in the dock-yards. But this flourishing condition of the navy did not last long. In consequence of the dissipation of the king, and his pecuniary difficulties, he neglected the navy on account of the expenses; the duke was sent abroad, and Mr Pepys to the Tower. A new set of commissioners were appointed, without experience, ability, or industry; and the consequence was, as stated by the commissioners of revision, that "all the wise regulations formed during the administration of the Duke of York were neglected; and such supineness and waste appear to have prevailed, that, at the end of not more than five years, when he was recalled to the office of lord high admiral, only twenty-two ships, none larger than a fourth rate, with two fire-ships, were at sea; those in harbour were quite unfit for service; even the thirty new ships which he had left building had been suffered to fall into a state of great decay, and hardly any stores were found to remain in the dock-yards."

The first act on the duke's return was the re-appointment of Mr Pepys as secretary of the admiralty. Finding the present commissioners unequal to the duties required

of them, he recommended others. Sir Anthony Deane, the most experienced of the shipbuilders then in England, was joined with the new commissioners. To him, it has been said, we owe the first essential improvement in the form and qualities of ships of the line, having taken the model of the *Superbe*, a French ship of seventy-four guns, which anchored at Spithead, and from which he built the *Harwich* in 1664. Others, however, are of opinion that no improvement had at this time been made on the model of the *Sovereign of the Seas* after she was cut down. The new commissioners undertook, in three years, to complete the repair of the fleet, and furnish the dock-yards with a proper supply of stores, on an estimate of L.400,000 a year, to be issued in weekly payments; and in two years and a half they finished their task, to the satisfaction of the king and the whole nation; the number of ships repaired and under repair being 108 sail of the line, besides a considerable number of vessels of smaller size. The same year the king abdicated the throne, at which time the list of the navy amounted to 173 sail, containing 101,892 tons, carrying 6930 guns, and 42,000 seamen.

The naval regulations were wisely left unaltered at the Revolution, and the business of the admiralty continued to be carried on chiefly, for some time, under the immediate direction of King William, by Mr Pepys, till the arrival of Admiral Herbert and Captain Russell from the fleet, into whose hands, he says, "he silently let it fall." Upon the general principles of that system, thus established with his aid by the Duke of York, the civil government of our navy has ever since been carried on.

In the second year of King William (1690), no less than thirty ships were ordered to be built, of sixty, seventy, and eighty guns each; and in 1697 the king, in his speech to parliament, stated that the naval force of the kingdom was increased to nearly double what he found it at his accession. It was now partly composed of various classes of French ships which had been captured in the course of the war, amounting in number to more than sixty, and in guns to 2300; the losses by storms and captures on our side being about half the tonnage and half the guns we had acquired. At the commencement of this reign, the navy, as we have stated, consisted of 173 ships, measuring 101,892 tons; at his death, it had been extended to 272 ships, measuring 159,020 tons, being an increase of ninety-nine ships and 57,128 tons, or more than one half both in number and in tonnage.

The accession of Queen Anne was immediately followed by a war with France and Spain, and in the second year of her reign she had the misfortune of losing a vast number of her ships, by one of the most tremendous storms that was ever known; but every energy was used to repair this national calamity. In an address of the House of Lords, in March 1707, it is declared as "a most undoubted maxim, that the honour, security, and wealth of this kingdom does depend upon the protection and encouragement of trade, and the improving and right encouraging its naval strength.....therefore we do in the most earnest manner beseech your majesty, that the sea affairs may always be your first and most peculiar care." In the course of this war were taken or destroyed about fifty ships of war, mounting 3000 cannon; and we lost about half the number. At the death of the queen, in 1714, the list of the navy was reduced in number to 247 ships, measuring 167,219 tons, being an increase in tonnage of 8199 tons.

George I. left the navy pretty nearly in the same state in which he found it. At his death, in 1727, the list consisted of 233 ships, measuring 170,862 tons, being a decrease in number of fourteen, but an increase in tonnage of 3643 tons.

George II. was engaged in a war with Spain in 1739, in consequence of which the size of our ships of the line

Matériel. ordered to be built was considerably increased. In 1744, France declared against us; but on the restoration of peace in 1748, it was found that our naval strength had prodigiously increased. Our loss had been little or nothing, whilst we had taken and destroyed, of the French twenty, and of the Spanish fifteen sail of the line, besides smaller vessels. The war with France of 1755 added considerably to the list, so that, at the king's decease, in 1760, it consisted of 412 ships, measuring 321,104 tons.

In the short war of 1762, George III. added no less than twenty sail of the line to our navy. At the conclusion of the American war in 1782, the list of the navy was increased to 600 sail; and at the signing of the preliminaries in 1783 it amounted to 617 sail, measuring upwards of 500,000 tons; being an increase of 185 ships and 157,000 tons and upwards since the year 1762. At the peace of Amiens the list of the fleet amounted to upwards of 700 sail, of which 144 were of the line. The number taken from the enemy, or destroyed, amounted nearly to 600, of which ninety were of the line, including fifty-gun ships, and upwards of two hundred were frigates; and our loss amounted to about sixty, of which six were of the line and twelve frigates.

The recommencement and long continuance of the revolutionary war, and the glorious successes of our naval actions; the protection required for our extended commerce, of which, in fact, we might be said to enjoy a monopoly, and for the security of our numerous colonies; contributed to raise the British navy to a magnitude to which the accumulated navies of the whole world bore but a small proportion. From 1808 to 1813, there were seldom less than from 100 to 106 sail of the line in commission, and from 130 to 160 frigates, and upwards of 200 sloops, besides bombs, gun-brigs, cutters, schooners, &c. amounting in the whole to about 500 sail of effective ships and vessels; to which may be added 500 more in the ordinary, and as prison, hospital, and receiving ships; making at least 1000 pendants, and measuring from 800,000 to 900,000 tons. The commissioners appointed to inquire into the state and condition of the woods, forests, and land revenues of the crown, state, in their report to parliament, in the year 1792, that, "at the accession of his majesty (Geo. III.) to the throne, the tonnage of the royal navy was 321,104 tons, and at the end of the year 1788 it had risen to no less than 413,467 tons." In 1808 it had amounted to the enormous extent of 800,000 tons, having nearly doubled itself in twenty years.

It must not, however, be supposed that the effective navy consisted of more than half this amount of tonnage. Since the conclusion of the war, it would appear that at least one half of the number of ships then in existence have been sold or broken up as unfit for the service; and as, by the list of the navy at the beginning of the year 1821, the number of ships and vessels of every description, in commission, in ordinary, building, repairing, and ordered to be

built, has been reduced to 609 sail, we may take the greatest extent of the present tonnage at 500,000 tons; but the greater part, if not the whole, of this tonnage may be considered as efficient, or in a state of progressive efficiency.

According to the printed list of the 1st January 1821, the 609 sail of ships and vessels appear to be as under:

			No.
1st Rates from 120 to 100 guns.....			23
2d Rates ... 86 ... 80 do.....	86	80	16
3d Rates ... 78 ... 74 do.....	78	74	90
4th Rates ... 60 ... 50 do.....	60	50	20
5th Rates ... 48 ... 22 do.....	48	22	107
6th Rates ... 34 ... 24 do.....	34	24	40
Sloops ... 22 ... 10 do.....	22	10	136

Making a total of.....432

To which being added, gun-brigs, cutters, schooners, tenders, bombs, troop-ships, store-ships, yachts, &c..... 177

Grand total..... 609

In the year 1836 the total number of ships of war, including every description mentioned in the above list, amounted to about 560 sail; of which ninety-five were ships of the line in a state of efficiency for any service, or of being speedily put into a fit state for sea, and many of them of a very superior class to any employed in the last war.

The increase in the size of our ships of war was unavoidable; France and Spain had increased theirs, and we were compelled, in order to meet them on fair terms, to increase the dimensions of ours; many of theirs were, besides, added to the list of our navy. The following sketch will show the progressive rate at which ships of the first order, or of 100 guns and upwards, were enlarged in their dimensions. In 1677 the first rates were from 1500 to 1600 tons. In 1720 they were increased to 1800 tons. In 1745 we find them advanced to 2000 tons. During the American war they were raised to 2200 tons. In 1795 the *Ville de Paris*, of 110, measured 2350 tons. In 1804 the *Hibernia*, of 110 guns, was extended to 2500 tons; and in 1808 the *Caledonia*, carrying 120 guns, measured 2616 tons, and here we stopped; but since then, the *Nelson*, the *Howe*, the *St Vincent*, the *Britannia*, the *Prince Regent*, the *Royal George*, and the *Neptune*, have been built, or are building, all nearly of the same dimensions, and from the same draught—nine such ships as the whole world besides cannot produce. The French had one ship larger than any of these, called the *Commerce de Marseilles*. She was taken by us in Toulon, but broke her back in a gale of wind.

The following are the comparative dimensions of the *Caledonia* and the *Commerce de Marseilles*.

	Length of Gun-deck.		Length of Keel.		Extreme Breadth.		Depth of Hold.		Tons.
	feet.	in.	feet.	in.	feet.	in.	feet.	in.	
<i>Caledonia</i>	205	0	170	9	53	8	23	2	2616
<i>Commerce de Marseilles</i>	208	4	172	0	54	9½	25	0½	2747

The following is the armament of the *Caledonia*: On the gun-deck she carries thirty-two guns, 32-pounders; middle-deck thirty-four 24-pounders, upper deck thirty-four 24-pounders, carronades; quarter-deck ten 32-pounders, and six 12-pounders, carronades; fore-castle two 32-pounders, and two 12-pounders, carronades. Her complement of men is 875.

At the commencement of the *third period*, we have a somewhat more precise account of the armament of our ships of war. On the 16th of May 1677, a committee of the navy board, ordnance, and certain naval officers, recommended to his majesty the following scheme for arming and manning the thirty new ships of the line ordered to be built by act of parliament.

Matériel.

Guns.	1st Rates.	2d Rates.	3d Rates.
Cannon (supposed 42 prs.).	No. 26	...	...
Demi-cannon (32 prs.).....	...	26	26
Culverins (18 prs.).....	28	26	...
Twelve-pounders.....	...	...	26
Sakers, upper-deck.....	28	26	...
... Forecastle.....	4	...	4
... Quarter-deck.....	12	10	10
Three-pounders	2	2	4
	100	90	70

For the 1st rate.....780 men.

For the 2d do.....660 do.

For the 3d do.....470 do.

The rates of ships immediately after the revolution were reduced, the first being turned to second rates, the second rates to third, &c. and the size of each class more equalized. But from this time forward it was found impossible to preserve any thing like uniformity in the several classes. So many ships captured from the French, Dutch, and Spaniards, were added to our navy, and so many new ones built after the models of ships taken from these maritime powers, that the various descriptions of ships of which our navy was composed became a very serious evil.

In the year 1745, a committee, composed of all flag-officers unemployed, of the commissioners of the navy who were sea-officers, under the presidency of Sir John Norris, and assisted by the master shipwrights, were ordered to meet, to consider and propose proper establishments of guns, men, masts, yards, &c. for each class of his majesty's ships; and, according to their recommendation, the rates, armaments, and complements of his majesty's ships were to be as follows:

Rate.	Guns.	Men.
1.....	100.....	850 or 750
2.....	90.....	750 or 660
3.....	{ 80.....	650 or 600
	{ 70.....	520 or 460
4.....	{ 60.....	420 or 380
	{ 50.....	350 or 280
5.....	44.....	280 or 220
6.....	24.....	160 or 140

But this establishment was very soon departed from; for, on the 3d of February 1747, the board of admiralty acquainted his majesty, that the French ship *Invincible*, lately captured, was found to be larger than his majesty's ships of ninety guns and 750 men; and suggested that this ship, and all other prizes of the like class, and also his majesty's ships of ninety guns, when reduced to two decks and a half, and seventy-four guns, should be allowed a complement of 700 men. And it further appears, that, at the latter end of the reign of George II. the rates of ships had undergone a very material alteration, for they consisted as under;

1st Rate.....	100 guns.
2d Rate.....	90 guns.
3d Rate.....	80 guns, 74—70—64 guns.
4th Rate.....	60 guns, 50.
5th Rate.....	44 guns, 38—36—32 guns.
6th Rate.....	30 guns, 28—24—20 guns.

The scales for measuring the ships were as various as their rates; and the evil was further increased by the varieties which it was found necessary to introduce in the rigging and arming of the ships of war. The masts, yards, rigging, and stores, were of so many and various dimensions, as to be not only highly inconvenient, but extremely

expensive. When Lord Nelson was off Cadiz with seven-
teen or eighteen sail of the line, he had no less than *seven*
different classes of seventy-four gun ships, each requiring
different sized masts, sails, yards, &c. so that, in the event
of one of these being disabled, the others could not supply
her with such stores as could be appropriated to her wants.

Present Rating of the Navy.

To remedy the many inconveniences resulting from the irregularities above mentioned, the lords of the admiralty suggested, by their memorial to the prince regent, which, by his order in council, of the 25th November 1816, was ordered to be carried into effect, that the ships of the navy should for the future be rated as under.

The first rate to include all three-deckers, in as much as all sea-going ships of that description carry a hundred guns and upwards.

The second rate to include all ships of eighty guns and upwards, on two decks.

The third rate to include all ships of seventy guns and upwards, but less than eighty guns.

The fourth rate to include all ships of fifty and upwards, but less than seventy guns.

The fifth rate to include all ships from thirty-six to fifty guns.

The sixth rate to include all ships from twenty-four to thirty-six guns.

And that the complements of men be established as under.

1st Rate.....900 — 850 or 800 men.

2d Rate.....700 or 650.

3d Rate.....650 or 600.

4th Rate.....450 or 350.

5th Rate.....300 or 280.

6th Rate.....175 — 145 or 125.

Of sloops, the complements established according to their size were to consist of 135, 125, 95, or 75 men; of brigs (not sloops), cutters, schooners, and bombs, sixty or fifty men.

Thus stands the rating and manning of the navy at present; but another war, or a new administration of the affairs of the navy, will, in all human probability, make new regulations in these respects. It is, however, of the utmost importance, with a view to convenience and economy, that the size and dimensions of the several rates should be kept as nearly as possible equal, in order that one description of stores may be applicable to every ship of the same rate. To this end, the commissioners of naval revision have recommended, "that the ships of each class or rate should be constructed, in every particular, according to the form of the best ship in the same class in our navy; of the same length, breadth, and depth; the masts of the same dimensions, and placed in the same parts of the ship, with the same form and size of the sails." A complete classification of masts, yards, and sails, has very recently been established.

Improvements in Construction.

If we look back to the days of Elizabeth, when the chain-pump, the capstan, the striking of the top-masts, the studding-sails, top-gallant-sails, sprit-sails, &c. were first introduced into the navy, one can scarcely conceive how they contrived to keep the sea for any length of time; but these improvements, important as they were, are trifling when compared with those aids and conveniences which have gradually been introduced since her reign, and which a ship of war now enjoys. When Sir Anthony Deane, in 1664, raised the lower ports of a two-decker four and a half feet out of the water, which had before been scarcely three feet, and made a ship of this class to stow six months' provisions instead of three, it was justly considered as a

Matériel.

Matériel. most important improvement; not less so, when the breadth of a ship of this class was carried to forty-five feet. "The builders of England," says Pepys, "before 1673, had not well considered that breadth only will make a stiff ship." It must be confessed, however, that, as far as the form of a ship's bottom depends on scientific principles, we have copied our best models from the French, sometimes with capricious variations, which more frequently turned out to be an injurious alteration than an improvement.

The first essential alteration in the form of our ships of the line was taken from the *Superbe*, a French ship of seventy-four guns, which anchored at Spithead, on the model of which, as already stated, the *Harwich* was built by Sir Anthony Deane in 1674; since which time we have constantly been copying from French models, improving or spoiling, as chance might determine. "Where we have built exactly after the form of the best of the French ships that we have taken," say the commissioners of naval revision, "thus adding our dexterity in building to their knowledge in theory, the ships, it is generally allowed, have proved the best in our navy; but whenever our builders have been so far misled by their little attainments in the science of naval architecture, as to depart from the model before them in any material degree, and attempt improvements, the true principles on which ships ought to be constructed (being imperfectly known to them) have been mistaken or counteracted, and the alterations, according to the information given to us, have, in many cases, done harm." Whilst, therefore, they add, "our rivals in naval power were employing men of the greatest talents and most extensive acquirements, to call in the aid of science for improving the construction of ships, we have contented ourselves with groping on in the dark in quest of such discoveries as chance might bring in our way."

Upon these grounds, and by the recommendation of the commissioners, a school for a superior class of shipwright apprentices was established in Portsmouth dockyard. It consisted of twenty-five young men of liberal education, whose mornings were passed in the study of mathematics and mechanics, and in their application to naval architecture; and the remainder of the day under the master shipwright in the mould loft, and in all the various kinds of manual labour connected with ship-building, as well as in the management and conversion of timber, so as to make them, at the same time, fully acquainted with all the duties in detail of a practical shipwright. After producing more officers than could be provided for, it was deemed expedient to break up the establishment.

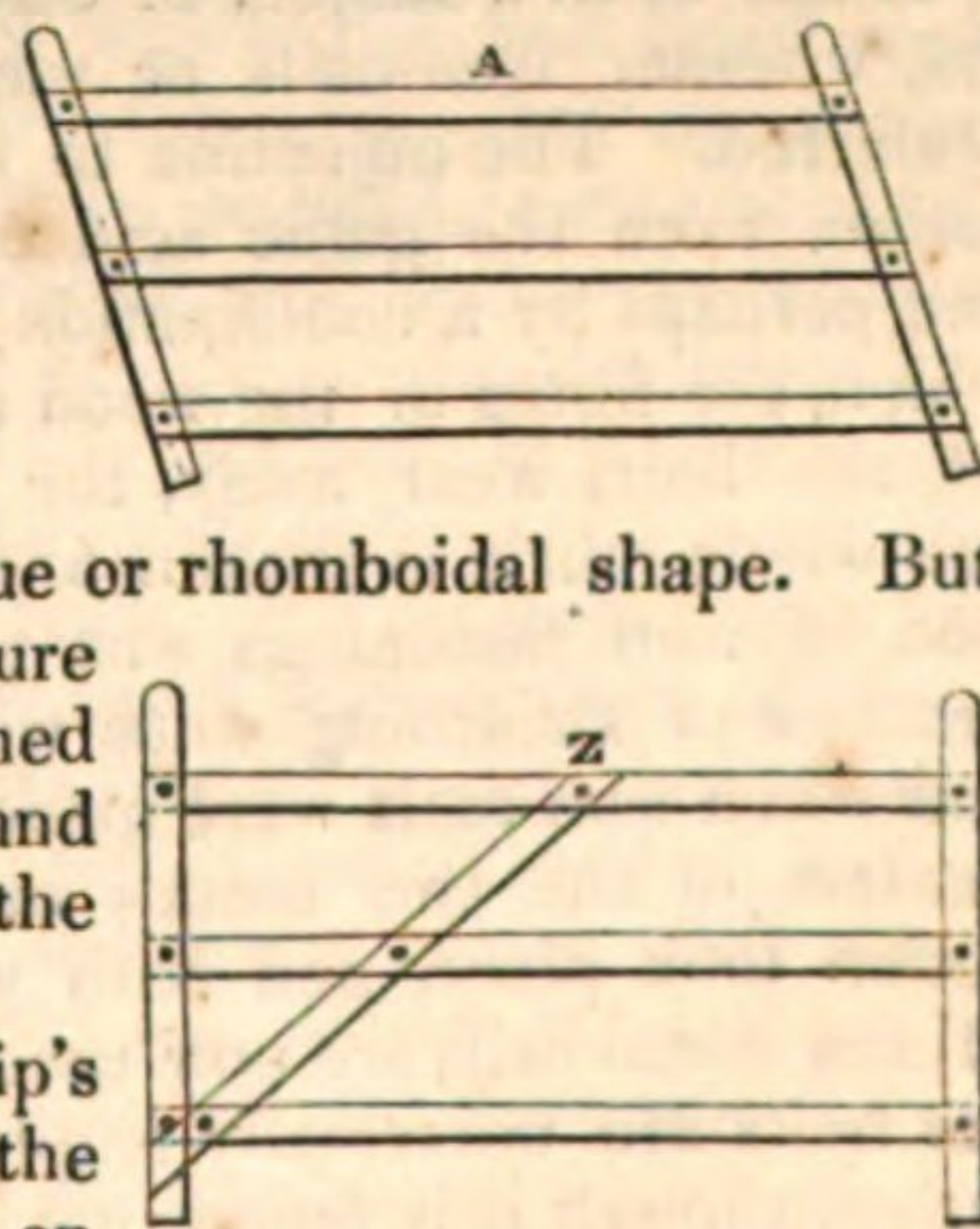
If, however, we have hitherto been inferior to the French in the scientific principles of ship-building, in the constructive part we have left them behind beyond all comparison; and, notwithstanding the narrow prejudices which have been more remarkably adhered to among shipwrights than among almost any other class of artisans, various alterations and improvements have from time to time been introduced into the mechanical part of naval architecture, which have added to the strength, the stability, the comfort, and convenience of our ships of war, and rendered them, in every point of view, superior to those of any other nation. The application of iron where wood was formerly used, and of copper for iron, has added considerably to the durability of ships; and the sheathing of their bottoms with copper, to their celerity; giving them, at the same time, a protection against the worm and those marine insects which were wont to adhere to them; yet it is remarkable how strong the prejudice was against this practice before it obtained a due degree of credit. In the fleet of Sir Edward Hughes in India there was but one coppered ship, and Rodney's squadron in the West Indies had but four that were coppered in the year 1799; but these were enough so completely to establish their superiority

over the others with wooden sheathing, that, in the year 1782, the whole British navy was coppered.

But the greatest of all improvements in the construction of ships of war, as tending to their strength and durability, is the system of diagonal bracing, introduced a few years ago by Mr (afterwards Sir Robert) Seppings, surveyor of the navy, and now universally adopted in all ships of the line and frigates; a system that may be said to have established a new era in naval architecture. Of all large machines destined to undergo severe shocks, a ship is perhaps the least skilfully and artificially contrived. Her several parts are put together on a principle so much opposed to that which constitutes strength, that if a ship, on the old construction, should be put upon wheels, and drawn over a rough pavement, the action of a day would shake her in pieces; but being destined to move in an element that closes upon her, and presses her equally on all sides, she is prevented from falling in pieces outwards, and her beams and decks preserve her from tumbling inwards. Whoever has observed a ship *in frame*, as it is called, on the stocks, that is, with only her timbers erected, must be forcibly reminded of the skeleton of some large quadruped, as of a horse or ox, laid on its back; the keel resembling the back-bone, and the curved timbers the ribs, which is, in fact, the name by which they sometimes go. These ribs, issuing at right angles from the keel, consist, in a seventy-four gun ship, of about 800 different pieces, the space between each rib seldom exceeding five inches. These ribs are covered with a skin or planks of different thicknesses within and without, also at right angles to the ribs, and fixed to them by means of wooden pins or tree-nails. In the inside three or four tiers of beams cross the skeleton from side to side, at right angles to both planks and ribs. These beams support the decks. At right angles to the beams are pieces of wood called carlings, and at right angles to these other pieces called ledges, and upon these the planks of the deck are laid in a direction at right angles to the beams, and parallel to the planking of the sides. From this sketch it will be perceived that all the parts of a ship are either parallel or at right angles to each other. The ribs form a right angle with the keel, the planks inside and out are at right angles to the ribs, the beams at right angles to these, the carlings to the beams, the ledges to the carlings, and the planks of the decks to the ledges, the beams, and the ribs.

Now, it is well known to every common carpenter, that this disposition of materials is the weakest that can be adopted. Thus, if five pieces of wood be pinned together in the shape of a parallelogram, it will require but little force to move them from the rectangular to the oblique or rhomboidal shape. But place a cross-bar, as in the figure Z, as carpenters are accustomed to do on a common gate, and it is no longer moveable on the points of fastening.

The strongest proof of a ship's partaking of this weakness in the old construction, is afforded on her being first launched into the water, when it is invariably found that the two extremities, being less water-borne than the middle, drop, and give to the ship a convex curvature upwards, an effect which, from its resemblance to the shape of a hog's back, is usually called *hogging*. In very weak or old ships this effect may be discovered in all the port-holes of the upper-deck, by their having taken the shape of lozenges, declining different ways from the centre of the ship to each extremity.



Matériel.
System of
diagonal
bracing.

Matériel.

To obviate this great defect, Seppings tried the experiment of applying to the ribs or timbers of the ship, from one extremity to the other, and from the orlop-deck downwards to the keelson, that well-known principle in carpentry, called *trussing*; being, in fact, a series of diagonal braces disposing themselves into triangles, the sides of which give to each other a mutual support and counter-action. These triangles were firmly bolted to the frame; and in order to give a continuity of strength to the whole machine, and leave no possible room for play, he filled the spaces between the frames with old-seasoned timber cut into the shape of wedges; but afterwards with a prepared cement, thus rendering the lower part of the ship or floor one solid, complete mass, possessing the strength and firmness of a rock; but a few years have proved that this cement has injured the timber.

The same principle of trussing is carried from the gun-deck upwards, from whence, between every port, is introduced a diagonal brace, which completely prevents the tendency of ships to stretch, or draw asunder their upper works. The decks, too, are made subservient to the securing more firmly the beams to the sides of the ship, by the planks being laid diagonally in contrary directions, from the midships to the sides, and at an angle of forty-five degrees with the beams, and at right angles with the ledges.

In frigates and smaller vessels, iron plates, lying at an angle of forty-five degrees with the direction of the trusses, are substituted for the diagonal frame of wood in ships of the line.

By this mode of construction, the ceiling or internal planking is wholly dispensed with, and a very considerable saving of the finest oak timber thereby effected; and, what is more important, those receptacles of filth and vermin between the timbers, which were before closed up by the planking, are entirely got rid of. This is not the least important part of the improvement, either as it concerns the soundness of the ship or the health of the crew. It is stated that a ship which had been three years in India, on being laid open, exhibited a mass of filth, mixed up with dead rats, mice, cockroaches, and other vermin, which was taken out in cakes, not unlike in appearance the oil-cake with which certain animals are fed; that the stench was abominable, and the timbers with which it was in contact rotten. No such filth can find a lodgment in ships of war as they are now built.

Fastenings.

It has been a subject of discussion amongst ship-builders, whether tree-nails or metallic fastenings are to be preferred. The objection to iron bolts is their rapid corrosion, from the gallic acid of the wood, the sea-water, and perhaps by a combination of both; in consequence of which, the fibres of the wood around them become injured, the bolts wear away, the water oozes through, and the whole fabric is shaken and disarranged. This corrosion of iron fastenings was most remarkable when the practice of sheathing ships with copper became general, and when iron nails were made use of to fix it; for, by the contact of the two metals in the sea-water, a galvanic action took place, and both were immediately corroded. Mixed metal nails are now used for this purpose; and copper bolts are universally employed below the line of flotation, though it is found that in these also oxidation takes place to a certain degree, and causes partial leaks. Various mixtures of metals have been tried, but all of them are considered as liable to greater objections than pure copper. It would appear, then, that tree-nails, if properly made, well seasoned, and driven tight, are the least objectionable, being seldom found to occasion leaks, or to injure the plank or timbers through which they pass. This species of fastening has at all times been used by all the maritime nations of Europe. The Dutch were in the

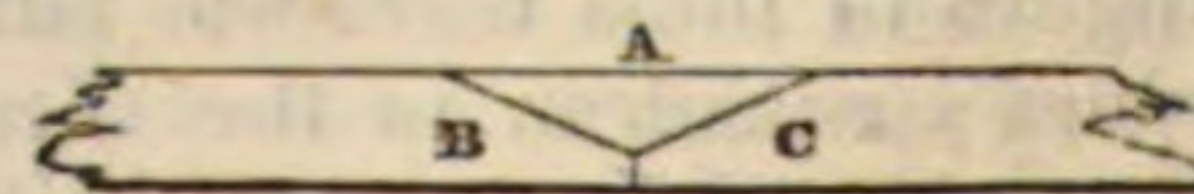
habit of importing them from Ireland, it being supposed that the oak grown in that country was tougher and stronger than any which could be procured on the Continent, and in all respects best adapted for the purpose. "Under all circumstances," says Mr Knowles, "it appears that the present method of fastening ships generally with tough, well-seasoned tree-nails, with their ends split, and caulked after being driven, and securing the butts of each plank with copper bolts well clenched, is liable to fewer objections, and more conducive to the durability of the timber, than any other which has been tried or proposed to be established."

The rounding the form of the bow in ships of the line is Round considered by nautical men as of great utility and importance. The plan was first proposed by Seppings in 1807, and has since been generally adopted. The removal of the head railing, and the continuing of the rounded form, give not only great additional strength to the ship, but also much more comfort and convenience to the crew, and security in that part of the ship when in action.

The scarcity of compass or crooked timber was, for some time, attended with serious injury to those ships of war while on the stocks, into which it was considered necessary to be introduced. The difficulty with which it was procured, the length of time which a ship sometimes remained on the stocks waiting for a few pieces of compass timber, the green wood, when found, being immediately added to the seasoned timber in other parts of the frame, gave to the ship different periods of durability; though, in the long run, the seasoned parts became affected by the green wood with which they were in contact, and a premature decay of the whole fabric was the consequence. Seppings, therefore, proposed a plan in 1806, which, by uniting short timbers according to a method called *scarphing*, enabled him to obtain every species of compass-form that could be required from straight timber. Since that period, the whole frame of a ship can be prepared at once, without waiting for particular pieces, and thus every part of it can be made to undergo an equal degree of seasoning.

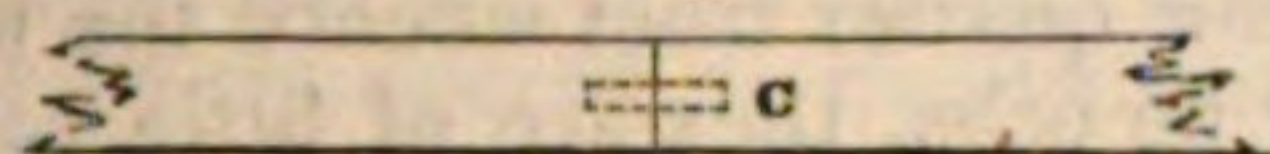
By the same ingenious and indefatigable surveyor of the navy, a plan was proposed and adopted in the year 1813, by which ships of the line were built with timber hitherto considered as applicable only to the building of frigates, and that which had been deemed only fit for inferior uses was appropriated to principal purposes. The *Talavera* was the first ship built on this principle, and the expense of her hull is stated to have been about a thousand pounds less than that of the *Black Prince*, a ship of similar dimensions built upon the old principle. The method by which the timbers were united was found, on trial of the *Talavera* with the *Black Prince*, whilst in frame, to give so much additional strength to the former, that it furnished the groundwork of the present mode of framing the British navy, by the introduction of the same union of materials in the application of the large, as was practised in that of the small timber, and from which both strength and economy have been united.

The building of the *Talavera*, and the great strength of her frame, led to the practice of putting together the frames of ships of the line from timbers of reduced lengths, and dispensing altogether with the chocks used for uniting their extremities, or, as they are technically called, their heads and heels. These chocks are of the form of an obtuse wedge, as A, and they are used to unite the two pieces of timber, as B and C, by firmly bolting the piece A to the two timbers B and C.



It generally happened, however, that, in the operation

Matériel. of thus fixing this chock, its two extremities split, and the surfaces of the chock and timbers not being in perfect contact, the moisture and air were admitted, and occasioned, as they always do, the dry rot to a greater degree in those parts of the ship than in most others; and as there were from four to five hundred of these chocks in a seventy-four gun ship, it will readily be conceived what mischief was done to the whole fabric, if the greatest care was not taken by the workmen to prevent their splitting, and to bring their surfaces immediately into contact. It is obvious, also, that a great deal of timber must have been cut to waste in making these chocks; and, in fact, they consumed timber in each ship, when it was at a high price, to the value of from L.1500 to L.2000, besides a considerable expense in workmanship; and when the ship came to be repaired, not one chock in six was found to be in a fit state to be used again. It is not easy to conceive how this practice of uniting the timbers of a ship's frame came to be introduced so generally into the British navy, more especially as it is unknown in any other nation; it was probably first done to preserve the length of some particular timbers, one of whose ends might be defective, and the unsound part cut away in the manner we see it, and the sound chock introduced to fill up the vacuity; but it is quite surprising how a practice should have become general which creates a waste of timber, an increase of workmanship, and sows the seeds of premature decay. To obviate these disadvantages, Sir Robert Seppings brought the but-ends of the timbers together thus,



and kept them together by means of a round dowel or coak, as C, just as the felloes of a carriage-wheel are fastened together. He justly observes, that the simplicity of the workmanship, the economy in the conversion of timber, and the greater strength and durability, although of considerable moment, are of but trifling importance when compared with the advantage of rendering timber generally more applicable to the frames of ships, which had heretofore been but partially so.

Another great improvement in the construction of ships of war, introduced by Seppings, is the round stern, which, however unsightly it may at first appear, from being accustomed to view the square stern with its grotesque carved work, is even in appearance more consistent with the termination of the sweeping lines of a ship's bottom, than the cutting them off abruptly with a square stern. But the additional strength which is thus given to a ship in that part which was hitherto the weakest, is alone sufficient to recommend the adoption of the plan in our ships of war, particularly in those of the larger classes. The advantages gained by circular sterns are thus enumerated by Sir Robert Seppings.

1. They give additional strength to the whole fabric of a ship.
2. They afford additional force in point of defence.
3. They admit of the guns being run out in a similar way to those in the sides.
4. From the circular form and mode of carrying up the timbers, an additional protection against shot is obtained, if the ship should be raked.
5. The stern being equally strong as the bow, no serious injury can accrue in the event of the ship being pooped; and the ship may be moored, if so required, by the stern.
6. A ship will sail better upon a wind, from the removal of the projections of the quarter galleries.
7. Ships of the line have now a stern-walk, protected by a veranda, and so contrived that the officers can walk all round, can observe the set of the sails, and the fleet in all directions.

8. The compass-timber heretofore expended for transoms is substituted with straight timber, and worked nearly to a right angle, which affords a considerable saving in the consumption of timber.

9. The counter being done away by the circular stern, the danger which arose from boats being caught under it is obviated.

In fact, the circular stern possesses many other advantages not necessary to be enumerated in this place.

Improvements in the Preservation of the Navy.

Not only is the new mode of construction highly favourable to the duration of ships, but the ravages of the disease which is known by the name of the dry rot, occasioned principally by the hurry in which ships were built in the course of the late war, and the unseasoned state of the timber made use of (see DRY ROT), led to such measures as tend most effectually to the preservation of the fleet.

In the first place, various modes were put in practice By precaution for assorting and seasoning the timber, and for protecting it from the vicissitudes of the weather. The oak and fir of Canada, which had been introduced to a great extent into our dock-yards during the time the Baltic was shut against this country, are now excluded; these woods having been found not only to possess little durability, but so friendly to the growth of fungi, that they communicated the baneful disease to all other descriptions of timber with which they came in contact. The practice of building ships under cover, introduced into our dock-yards in the course of the war, and carried to an extent so as to have roofed over almost every dock and slip in all the yards, has been destructive to the growth of dry rot. See DOCK-YARDS.

A ship now placed in ordinary, whether new or newly repaired, is carefully housed over, so that no rain can reach her lower decks; several streaks of planks are removed from her sides and decks to admit a thorough draft of air, which is sent down by wind-sails, and which pervades every part of the ship; and these, with the addition of two small airing-stoves, in which a few cinders are burned, render her perfectly dry and comfortable on all the decks and store-rooms. All the shingle ballast is removed out of the hold, which is thoroughly cleaned and restowed with iron ballast. The former practice of mooring two ships together, by which the two sides next to each other, deprived of the sun and a free circulation of air, were generally found to be decayed, is discontinued. The lower masts are left standing, and their tops housed over; the gun-carriages and several of the stores are left on board; and such, in short, is the state of a ship in ordinary, that she may be fitted in all respects for proceeding to sea in half the usual time. "The ships," says Mr Knowles, "are frequently pumped to clear them of bilgewater, and cleanliness in every respect is attended to; the lower decks are rubbed with dry stones, commonly called holly-stones, and with sand, the use of water upon them being strictly forbidden." But that which most of all is likely to insure the preservation of the fleet whilst in a state of ordinary, is the recent regulation, which places the ordinary under the immediate superintendence of a captain at each port, with other commissioned officers under his orders, who take care that the warrant-officers and ship-keepers attend to the proper airing, ventilating, and keeping clean and dry their respective ships.

A practice has recently been introduced into the dock-yards, of steeping oak timber in salt-water for several months, and then stacking it till it becomes perfectly dry, which is said to have entirely put a stop to the progress of dry rot where it had already commenced, and to act as a

Matériel. preventive to that disease. Some doubts, however, were entertained on this point, and the practice has been discontinued. The Americans seem to place little confidence in the good effects which are said to have been experienced from the immersion of timber. Rodgers, the commissioner of their navy, states, in an official report addressed to the secretary, that "experiments have been made to arrest the dry rot in ships, by sinking them for months in salt-water, but without success. The texture of the wood was found to be essentially injured by being thus water-soaked, and it became more subject to this disease than before it was sunk. The ships were also injured in their fastenings, and the atmosphere within them was kept in a constant state of humidity, whence, among other ill effects, proceeded injury to provisions and stores, and sickness to the crews." The truth is, the American timber, with the single exception, perhaps, of the live-oak, is remarkably subject to dry rot, of which, during the late war, we had fatal experience. Mr Rodgers, however, accounts for the condition in which the oak and pine were received in England from Canada, by their immersion in water. "The Canada timber," he observes, "is brought down the St Lawrence in large rafts, continues months in water, and in that saturated state is landed and exposed to frost; every attempt to season it under cover is unavailing; its pores never close again, and when used as ship-timber, dry rot ensues, which, when once commenced, can never be arrested, but by taking out all the pieces in any degree affected." The Russians, he says, are so fully aware of the injurious effects of soaking ship-timber in water, that it is brought from great distances down the rivers in crafts instead of rafts. The Russian ships, however, with all this precaution, are not remarkable for durability. The ships built at Antwerp by the French were in a state of rottenness before they were launched; but whether this was owing to the bad quality of the timber of the German forests, or to its being water-soaked in rafting down the Rhine, remains doubtful. But we can have no doubt that porous timber is injured by moisture, though the solid British oak may be improved by the dissolution of its sap juices, to the fermentation of which the disease known by the name of dry rot may perhaps be chiefly owing. "Water," says Lescalier, a French writer of considerable merit on the subject, "seems to be favourable to the decomposition of the sap of timber when immersed; but it substitutes in its place another kind of moisture not less destructive, of which the timber, though afterwards exposed to the air, will not easily get rid of; besides, it weakens and destroys the grain of the wood." "The best means," he adds, "of preserving timber, appears to be that of keeping it in well-constructed and airy sheds, in a vertical position, so that the moisture which remains in the interior of the logs, by running along the fibres of the wood, may be enabled to issue from the lower extremity. Timber thus kept dry, under shelter, will preserve itself for ages." Mr Knowles, secretary to the committee of surveyors of his majesty's navy, in his treatise on the Means of Preserving the British Navy, is led to conclude, from a variety of experiments, "that timber is better seasoned when kept for two years and a half under cover, than when placed for six months in water, and then for two years in the air, protected from the rain and sun; that it loses more in seasoning, by having been, during the six months of immersion, alternately wet and dry, than the whole time under water; and that the loss in moisture is greater in all cases in a given time when the but-ends are placed downwards." And he adds as a general principle, "that no timber should be brought into use in this country until it has been felled at least three years."

By roofing the ships. Next to the system of diagonal braces, the roofing thrown over them whilst building and in ordinary may be considered as the greatest of all improvements for the pre-

servation of the navy. The utility of it is so obvious, *Matériel.* that it is quite extraordinary such a practice should not have been earlier adopted; more especially as, at Venice, at Carlsrona, and at Cronstadt, ships of war had long been built, repaired, and protected under covered roofs. It was strongly recommended to the English ship-builders fifty years ago, but without effect; and had it not been for the extraordinary ravages of the dry rot in the unseasoned timber-built ships of the navy, we should still have been without roofs to our docks and slips.

If the dock-yards were of sufficient capacity, there can be no doubt that the efficient plan to accomplish their du- *By other means.* rability, would be that of keeping them on the slip, when built, under cover. A large frigate, the Worcester, has remained on the slip and under cover for six or seven years, and there is not a flaw in her of any kind. It was stated by Mr Strange, when examined by the commissioners for land revenue, that in the year 1790 there were twenty-two ships of the line under roofs in the port of Venice, some of which had remained in that situation fifty-nine years. Since, however, it is utterly impracticable to keep our navy on slips, or in dry docks, the next important consideration is, how best to preserve them afloat in a state of ordinary. Various expedients have been at different times resorted to in order to prevent the premature decay of ships laid up in this state during peace. The two great requisites for their preservation are ventilation and cleanliness. To promote the former, wind-sails were in general use, though, if not attended to, so as to oppose the open part to the quarter from whence the wind blows, or if the weather be calm, they are of little benefit. Pneumatic machines of various kinds, as pumps and bellows, have been applied to force out the foul air, and introduce atmospherical air into the lower parts of a ship's hold. Heated air from stoves, placed in various parts of the ship, and conducted through tubes, was thought at one time to be efficacious in the preservation of the navy; but experience soon showed that the heat thus circulated was so far objectionable, as it tended to encourage the growth of fungus where there was any moisture lodged, and in the timber which had not been thoroughly seasoned. Perhaps no better means can be suggested than those we have described to be in practice, namely, to keep them clean, to admit as much dry air as possible, and to exclude all moisture.

Finally, if we take into consideration the numerous improvements which a war, unparalleled in its duration, has been the means of introducing into the *matériel* of the navy, whether it regards the economy of its application, the construction of the ships, and their mode of preservation, we may safely say, that at no former period was this country in possession of such a navy as at present, in respect of the number, size, and good condition of the ships which compose a fleet, superior to those of the whole world besides; and it is gratifying to find, that, with all the enormous consumption of the military and mercantile navy, it does not appear that the naval resources of Great Britain are at all impaired.

Naval Resources.

It is of essential importance that the supply of stores for the use of the fleet should not only be adequate to the demand, but that a sufficient stock should be kept on hand to answer any sudden emergency. This is the more necessary with regard to those species of stores which are derived from foreign nations.

The principal articles of consumption required for build-Principal ing and equipping a fleet are, hemp, canvass, pitch, tar, naval iron, copper, and timber. All these articles might un-*stores.* questionably be produced in sufficient quantities in the united kingdom and her colonies, if necessity absolutely

Matériel. required it. Hemp, for instance, might be grown to any extent in Great Britain and Ireland, were not the land more advantageously employed in raising other articles of consumption, and if it could not be cheaper imported from Russia. In the East Indies, the Sunn hemp (inferior, it is true, to Russia hemp) might be procured to any extent; and other plants, both there and at home, might be substituted for the making of cordage and canvass. For pitch and tar, recourse might be had to the pitch-lake on the island of Trinidad, and the coal-tar, of which an inexhaustible supply may be had at home. The lake is about four miles in circumference, and many feet in depth, of solid pitch; and it is stated that, when mixed with oil or tallow, it is rendered fit for all the purposes to which pitch and tar are usually applied. It has the advantage of securing ships' bottoms against the attack of the worm, which is very active in the neighbouring Gulf of Para; and it does not corrode iron. The coal-tar of home manufacture, from some prejudice or other, was refused a fair trial till very lately, and it is now deemed not inferior for many purposes to the common tar. For painting or tarring over wood-work of every kind, it is said to stand exposure to the weather even better than the common tar; and it is used for injecting in large quantities between the timbers of ships, as a preservative from the dry rot; its powerful smell having also the good effect of driving rats and other vermin out of the ships on which it is employed.

Pitch and tar.

Copper and iron. In the two important articles of copper and iron, our own resources may be considered as inexhaustible. Formerly it was deemed indispensable that certain articles should be made of Swedish iron, but of late years our own has been manufactured in every respect equally good; and the extensive application of this metal in bridges, barges, dock-gates, roofs, rafters, floors, &c. has been equally progressive in most naval purposes. Iron knees, and other modes of binding the beams to the side timbers of ships, are now substituted for those large and crooked pieces of timber which were once deemed absolutely necessary. Our cables, rigging, buoys, and tanks for holding water, are also now of iron.

Timber. But the most important article of demand for the use of the navy is timber, principally oak, concerning the supply of which from our own territories different opinions have been entertained. A deficiency in other articles may readily be supplied. A failure in the importation of hemp, for instance, in any one year, might be remedied the next, by an extended cultivation of that article; but it requires a whole century to repair any defalcation of oak timber, and to render us independent of other nations. Nor has the subject been sufficiently elucidated, so as to form a just opinion, by the several committees of the House of Commons, the evidence produced being almost always loose, and generally contradictory. The committee of 1771, which was directed to inquire into the state of oak timber throughout the kingdom, either from a disagreement of opinion, or defect of evidence, or a wish to avoid giving alarm, prayed the house to discharge that part of its order which required them to report their opinion. The commissioners of woods and forests, however, in their report laid before parliament in 1792, appeared to establish the fact of an alarming scarcity of oak timber in general, but more particularly of large naval timber, both in the royal forests and on private estates. And if such was really the fact in 1792, it will readily be conceived what the state of timber fit for naval purposes must have been at the conclusion of the revolutionary war, when the amount of private shipping had increased from 1,300,000 tons to 2,500,000 tons, or nearly doubled; that of the East India Company, in the same period, from 79,900 tons to 115,000 tons; and that of the navy from 400,000 to 800,000 tons:

to say nothing of the vast consumption of oak timber in **Matériel.** all kinds of mill-work and other machinery; in the barrack and ordnance departments; in mines, collieries, and agriculture; in docks and dock-gates; in piers, locks, and sluices; in boats, barges, lighters, bridges, and a great many other purposes to which this timber is applied. From these, and many other causes, the diminution of oak timber was infinitely greater than the commissioners had calculated upon, and yet they recommended that 100,000 acres, belonging to the crown, should be set apart and planted, as necessary for the future supply of the navy. A bill to this effect, relating to the New Forest, passed the Commons, but was thrown out by the Lords.

On the departments of the surveyor-general of the land revenue and the surveyor-general of the woods and forests being united, the board of commissioners made their first report, which was printed, by order of the House of Commons, in June 1812. In this report, it is stated that, taking the tonnage of the navy in 1806 at 776,087 tons, it would require, at one and a half load to a ton, 1,164,085 loads to build such a navy; and supposing the average duration of a ship to be fourteen years, the annual quantity of timber required would be 83,149 loads, exclusive of repairs, which they calculate would be about 27,000 loads, making in the whole about 110,000 loads; of which, however, the commissioners reckon, may be furnished 21,341 loads as the annual average of prizes; and of the remaining 88,659 loads, they think it not unreasonable to calculate on 28,659 from other sources than British oak. "This," they observe, "leaves 60,000 loads of such oak as the quantity which would be sufficient annually to support, at its present unexampled magnitude, the whole British navy, including ships of war of all sorts, but which may be taken as equivalent together to twenty 74-gun ships, each of which, one with another, contains about 2000 tons, or would require, at the rate of a load and a half to the ton, 3000 loads, making just 60,000 loads for twenty such ships."

Now it has been supposed that not more than forty oak trees can stand on an acre of ground, so as to grow to a full size, fit for ships of the line, or to contain each a load and a half of timber; 50 acres, therefore, would be required to produce a sufficient quantity of timber to build a 74-gun ship, and 1000 acres for twenty such ships; and, as the oak requires at least 100 years to arrive at maturity, 100,000 acres would be required to keep up a successive supply for maintaining a navy of seven or eight hundred thousand tons. The commissioners further observe, that as there are twenty millions of acres of waste lands in the kingdom, a two-hundredth part set aside for planting would at once furnish the whole quantity wanted for the use of the navy.

This calculation, we suspect, is overrated by about one half. In the first place, it supposes a state of perpetual war, during which the tonnage of the whole navy is considered as more than double of what it now actually is; and, in the second place, it reckons the average duration of the navy at fourteen years only, which, from the improvements that have taken place in the construction and preservation of ships of war, with the resources of teak ships, built in India, we should not hesitate in assuming at an average of twice that number of years; and if so, the quantity of oak required for the navy will be nothing like that which the commissioners have stated. This, we think, will appear from a statement made (apparently on good authority) in the midst of the war, when the ships of the line built in merchants' yards were falling to decay after a service of five or six years.

"Assuming 400,000 tons as the amount of tonnage to be kept in commission, and the average duration of a ship of war at the moderate period of twelve and a half years,

Matériel. there would be required an annual supply of tonnage, to preserve the navy in its present effective state, of 32,000 tons; and as a load and a half of timber is employed for every ton, the annual demand will be 48,000 loads. The building of a 74-gun ship consumes about 2000 oak trees, or 3000 loads of timber, so that 48,000 loads will build eight sail of the line and sixteen frigates. Allowing one fourth part more for casualties, the annual consumption will be about 60,000 loads, or 40,000 full-grown trees, of which thirty-five will stand upon an acre of ground. The quantity of timber, therefore, necessary for the construction of a 74-gun ship will occupy fifty-seven acres of land, and the annual demand will be the produce of 1140 acres. Allowing only ninety years for the oak to arrive at perfection, there ought to be now standing 102,600 acres of oak plantations, and an annual felling and planting, in perpetual rotation, of 1140 acres, to meet the consumption of the navy alone. Large as this may seem, it is little more than twenty-one acres for each county in England and Wales; which is not equal to the belt which surrounds the park and pleasure-grounds of many estates."

The above calculation proceeds upon the principle that every acre is covered with trees fit for naval purposes, or that it contains thirty-five trees, with a load and a half of timber in each. It may be doubted, however, if, on the average of plantations, we shall find more than one tenth of that number on an acre; and as the same writer endeavours to show that the quantity of oak timber consumed in the navy is only about one tenth part of the whole consumption of the country, instead of 102,600 acres being sufficient for a perpetual supply, there would be required some ten or twelve millions of acres, in plantations similar to those at present existing, to supply the demand for oak timber. Whether such a quantity exists or not, the fact is certain, that, long before the conclusion of the war, a scarcity began to be felt, especially of the larger kind of timber, fit for building ships of the line; and so great was this scarcity, that if Sir Robert Seppings had not contrived the means of substituting straight timber for those of a certain form and dimension, before considered as indispensable, the building of new ships must have entirely ceased.

If, however, the growth of oak for ship timber was greatly diminished during the war, so as to threaten an alarming scarcity, there is little doubt that, from the increased attention paid by individuals to their young plantations, and the great extension of those plantations, as well as from the measure of allotting off portions of the royal forests to those who had claims on them, and enclosing the remainder for the use of the public, this country will, in future times, be fully adequate to the production of oak timber equal to the demand for the naval and mercantile marine. It will require, however, large and successive plantations, on account of the slow growth of the oak. But there is another tree, of late years very generally planted on rising grounds, which bids fair to become an object of great national importance, as furnishing the best, and perhaps the only, substitute for oak timber. We mean the larch, which thrives well and grows rapidly in bad soils and exposed situations, the timber of which has been found to be durable, and, from several experiments, not inferior in strength, toughness, and elasticity to oak. So rapid is its growth, that the Duke of Atholl received twelve guineas for a single larch fifty years old; the timber was valued at two shillings a foot. A larch of seventy years' growth produces timber fit for all naval purposes, and may be considered as equal in size to an oak of double that age. The dimensions of a larch tree cut down at Blair Atholl in 1817, and then seventy-nine years of age, were as follows: viz. stem, eighty-two feet; top, twenty feet; total height, 102 feet; girth at the ground, twelve feet; at nineteen feet, eight

feet three inches and a half; and at fifty-seven feet, four feet ten inches; solid contents, 252·8 cubic feet. Another larch, growing at Dunkeld, measured, in the year 1819, when it was eighty years old, and in full vigour, as follows, viz. height of stem seventy-five feet, top fourteen feet; total height ninety feet: at one foot from the ground, seventeen feet eight inches in girth; at ten feet, ten feet four inches; and at seventy feet, three feet two inches; its contents, 300 cubic feet, or six loads. For all kinds of mill-work, as wheels, axle-trees, &c. the utility of the large larch wood is unquestionable; and the thinnings are excellent for pailing, rails, and hurdles. The value of its application for naval purposes has been put to the test of experiment; two frigates of twenty-eight guns, one built entirely of larch from the Duke of Atholl's plantations, the other of Riga fir (which is inferior only to oak), having been intended to go through the same service, precisely in the same parts of the world, in order to ascertain their comparative durability.

In addition to our resources of naval timber at home, we have wisely availed ourselves of those which India affords for building ships of war at Bombay, of teak, a wood far superior in every respect to oak, and many times more durable; not liable to corrode iron or other metallic fastenings, not susceptible of the dry rot, nor subject to the attack of the worm.

II.—PERSONEL OF THE NAVY.

The *personel* of the navy is composed of two different bodies of men, the seamen and the marines, each of whom have their appropriate officers.

The commissioned officers of the former consist of flag-officers, captains, commanders, and lieutenants. Flag-officers are divided into three ranks, and each rank into three squadrons, distinguished by the colours red, white, and blue; as admiral of the red, white, or blue; vice-admiral of the red, white, or blue; rear-admiral of the red, white, or blue; the admiral wearing his colour at the main, the vice-admiral at the fore, and the rear-admiral at the mizen-mast head. There is also an admiral of the fleet, who, if in command, would carry the union flag at the main. There are besides superannuated rear-admirals, enjoying the rank and pay of a rear-admiral, but incapable of rising to a higher rank on the list. There is also in the navy the temporary rank of commodore, who is generally an old captain, and is distinguished by wearing a broad pendant. He ranks next to the junior rear-admiral, and above all captains, except where the captain of the fleet shall be a captain, who, in that situation, takes rank next to the junior rear-admiral.

The commissioned officers of the navy take rank with those of the army as follows.

Navy.	Army.
Admiral of the fleet.	Field-marshal.
Admiral.	General.
Vice-admiral.	Lieutenant-general.
Rear-admiral.	Major-general.
Commodore.	Brigadier-general.
Captain of three years.	Colonel.
Captain under ditto.	Lieutenant-colonel.
Commander.	Major.
Lieutenant.	Captain.

And all officers of the same rank command according to the priority of their commissions, or, having commissions of the same date, according to the order in which they stand on the list of the officers of the navy, except in the case of lieutenants of flag-ships, who take precedence according as the flag-officer shall think fit to appoint them.

The warrant-officers of the navy may be compared with

Personel.

Personel. the non-commissioned officers of the army. They take rank as follows, viz. master, second master, gunner, boatswain, carpenter. There are other warrant-officers of the navy, who, though non-combatants, constitute a part of the establishment of the larger classes of ships of war. These are, the chaplain, surgeon, surgeon's assistant, purser; to which may be added, as part of the staff of a fleet or squadron, secretary to the admiral or commander-in-chief, and physician to the fleet. In steam-vessels, the engineers rank next after the warrant-officers.

Warrant-officers. The petty officers are very numerous, the principal of whom are masters' mates and midshipmen. Their names or ratings will be seen in the table of the establishment of the ratings and pay in the several classes of ships of war.

Petty officers. By the king's order in council, the following regulations are established for the promotion of commissioned officers of the navy. Midshipmen are required to serve six years on board some of his majesty's ships, two of which years they must have been rated as midshipmen, to render them eligible to the rank and situation of lieutenant.

Order of promotion. No lieutenant can be promoted to the rank of commander until he has been on the list of lieutenants during two years; and no commander to the rank of captain until he has been on the list for one year. Captains become admirals in succession according to their seniority on the list, provided they shall have commanded four years in a rated ship during war, or six years during peace, or five years in war and peace combined.

No person can be appointed to serve as master of one of his majesty's ships who shall not have served as second master; and no person can be appointed as second master until he has passed such examination as may from time to time be directed.

No person can be appointed gunner or boatswain unless he shall have served one year as a petty officer on board one or more of his majesty's ships, and produce certificates of his good conduct, and undergo the necessary examination.

No person can be appointed carpenter unless he shall have served an apprenticeship to a shipwright, and been six months a carpenter's mate on board one or more of his majesty's ships.

No person can be appointed purser, unless he shall have been rated and discharged the duties of a captain's clerk for two complete years, one year as captain's clerk, and been employed in the office of the secretary to a flag-officer for one other year, produce good certificates, and find such security for the honest and faithful discharge of his duty as shall be required.

No person can be appointed chaplain to one of his majesty's ships until he has received priest's orders; but he may be appointed to act whilst in deacon's orders.

No person can be appointed surgeon to one of his majesty's ships until, by long and meritorious services, he has discharged the duties of assistant surgeon; and all persons applying for the situation of assistant surgeon must undergo an examination touching their qualifications before the physician general of the navy.

Royal marines. The royal marines consist of four great divisions; the first stationed at Chatham, the second at Portsmouth, the third at Plymouth, and the fourth at Woolwich. They are composed of seventy-two companies, besides two companies of royal marine artillery, whose head-quarters are at Fort Monckton, Gosport. The first division has twenty-one companies; the second, eighteen companies; the third, twenty companies; and the fourth, thirteen companies. The officers of royal marines take rank with the officers of the line in the army.

A colonel commandant, who is a general officer in the corps, is resident in London; and to each of the divisions is a colonel commandant, two lieutenant-colonels, and two

Personel. majors, with a proper number of captains and subaltern officers. Whilst on shore, the marines are subject to the same regulations as the army; but when embarked, they are liable to the naval articles of war.

Each division has its paymaster, a captain in the corps; a barrackmaster, also a captain; two adjutants, and a quartermaster, who are first lieutenants; and to each division is a surgeon and an assistant surgeon. There is also a retired list of officers, who, in consideration of wounds, infirmities, and long and meritorious services, are permitted to receive their full pay.

The commissions of officers of every rank in the marine corps are signed by the sovereign; but all commissions of officers of the navy are signed by two or more of the lords commissioners of the admiralty. But the marines, whether ashore or afloat, are, as well as the officers of the navy, under the immediate direction and control of the lords commissioners of the admiralty. All the appointments of commissioned and warrant officers to ships are made exclusively by the lords of the admiralty, or made subject to their confirmation, unless in cases of the death or dismissal of officers by sentence of court-martial on foreign stations, when the admiral commanding has the power to fill up the vacancies. And the duties of each rank are pointed out in a code of instructions emanating from that board, and sanctioned by the sovereign's order in council.

The civil powers and duties of the lord high admiral, Military or lords commissioners of the admiralty, are treated of duties of the lord high admiral. under the article ADMIRAL. Their military powers are more extensive and important. By their orders all ships are built, repaired, fitted for sea, or laid up in ordinary, broken up, or sold; put in commission or out of commission, armed, stored, and provisioned; and employed on the home or foreign stations. All appointments or removals of commission and warrant officers, with the exception of masters and surgeons, are made by them, and all instructions issued for the guidance of their commanders; all promotion in the several ranks emanates from them; all honours bestowed for brilliant services, and all pensions, gratuities, and superannuations for wounds, infirmities, and long services, are granted on their recommendation. All returns from the fleet are sent to the board of admiralty, and every thing that relates to the discipline and good order of every ship. All orders for the payment of naval monies are issued by the lords commissioners of the admiralty; and the annual estimate of the expenses of the navy is prepared by them, and laid before parliament for its sanction. All new inventions and experiments are tried by their orders before being introduced into the service; all draughts of ships must be approved by them; all repairs, alterations, and improvements in the dock-yards, and all new buildings of every description, must be submitted for their decision before they are undertaken.

All flag-officers, commanders-in-chief, are considered as Command- responsible for the conduct of the fleet or squadron under their-in- their command. They are bound to keep them in perfect chief. condition for service; to exercise them frequently in forming orders of sailing and lines of battle, and in performing all such evolutions as may occur in the presence of an enemy; to direct the commanders of squadrons and divisions to inspect the state of each ship under their command, to see that the established rules for good order, discipline, and cleanliness, are observed, and occasionally to inquire into these and other matters themselves. They are required to correspond with the secretary of the admiralty, and report to him all their proceedings, for the information of the board.

If a commander-in-chief should be killed in battle, his flag is to be continued flying, and intelligence conveyed, by signal or otherwise, to the next in command, who is immediately to repair on board, leaving his own flag (if a

Personel. flag-officer) flying, and direct the operations of the fleet until the battle be ended, or the enemy out of sight.

Other flag-officers. Every flag-officer serving in a fleet, but not commanding it, is required to superintend all the ships of the squadron or division placed under his orders; to see that their crews are properly disciplined; that all orders are punctually attended to; that the stores, provisions, and water, are kept as complete as circumstances will admit; that the seamen and marines are frequently exercised; and that every precaution is taken for preserving the health of their crews; for all which he is responsible to the commander-in-chief. When at sea, he is to take care that every ship in his division preserve her station, in whatever line or order of sailing the fleet may be formed; and in battle he is to observe attentively the conduct of every ship near him, whether of the squadron or division under his immediate command or not; and at the end of the battle he is to report it to the commander-in-chief, in order that commendation or censure may be passed, as the case may appear to merit; and he is empowered to send an officer to supersede any captain who may misbehave in battle, or whose ship is evidently avoiding the engagement. If any flag-officer be killed in battle, his flag is to be kept flying, and signals to be repeated, in the same manner as if he were still alive, until the battle shall be ended; but the death of a flag-officer, or his being rendered incapable of attending to his duty, is to be conveyed as expeditiously as possible to the commander-in-chief.

Captain of the fleet. The captain of the fleet is a temporary rank, where a commander-in-chief has ten or more ships of the line under his command; it may be compared with that of adjutant-general in the army. He may either be a flag-officer, or one of the senior captains; in the former case, he takes his rank with the flag-officers of the fleet; in the latter, he ranks next to the junior rear-admiral, and is entitled to the pay and compensation of a rear-admiral. All orders of the commander-in-chief are issued through him, and all returns of the fleet are made through him to the commander-in-chief. He is appointed and can be removed from his situation only by the lords commissioners of the admiralty.

Commodore. A commodore is a temporary rank, and of two kinds; the one having a captain under him in the same ship, and the other without a captain. The former has the rank, pay, and allowances of a rear-admiral, the latter such additional pay as the lords of the admiralty may direct. They both carry distinguishing pendants.

Captain. When a captain is appointed to command a ship of war, he commissions the ship by hoisting his pendant; and if fresh out of the dock, and from the hands of the dock-yard officers, he proceeds immediately to prepare her for sea, by demanding her stores, provisions, guns, and ammunition, from the respective departments, according to her establishment. He enters such men as may volunteer and be fit for the service (in time of peace), or which may be sent to him from some rendezvous for raising men in time of war; and he gives them the several ratings of petty officers, able seamen, ordinary, or landsmen, as their apparent qualifications may entitle them to. If he be appointed to succeed the captain of a ship already in commission, he passes a receipt to the said captain for the ship's books, papers, and stores, and becomes responsible and accountable for the whole of the remaining stores and provisions; and, to enable him to keep the ship's accounts, he is allowed a clerk of his own appointing.

The duty of the captain of a ship, with regard to the several books and accounts, pay-books, entry, musters, discharges, &c. is regulated by various acts of parliament; but the state of the internal discipline, the order, regularity, cleanliness, and the health of the crews, will depend mainly on himself and his officers. In all these respects,

the general printed instructions for his guidance are particularly precise and minute. And, for the information of the ship's company, he is directed to cause the articles of war, and abstracts of all acts of parliament for the encouragement of seamen, and all such orders and regulations for discipline as may be established, to be hung up in some public part of the ship, to which the men may at all times have access. He is also to direct that they be read to the ship's company, all the officers being present, once at least in every month. He is not authorized to inflict any corporal punishment on any commissioned or warrant officer, but he may place them under arrest, and suspend any officer who shall misbehave, until an opportunity shall offer of trying such officer by a court-martial. He is enjoined to be very careful not to suffer the inferior officers, or men, to be treated with cruelty or oppression by their superiors. He alone is to order punishment to be inflicted, which he is never to do without sufficient cause, nor ever with greater severity than the offence may really deserve, nor until twenty-four hours after the crime has been committed, which must be specified in the warrant ordering the punishment; and all the officers and the whole ship's company are to be present at every punishment, which must be inserted in the log-book, and an abstract at the end of every quarter made out and sent to the admiralty; a regulation which is said to have been attended with infinite benefit to the strict and just discipline of the naval service.

The lieutenants take the watch by turns, and are at such times intrusted, in the absence of the captain, with the command of the ship. The one on duty is to inform the captain of all occurrences which take place during his watch, as strange sails that may be in sight, signals from other ships in company, change of wind, &c. He is to see that the ship be properly steered, the log hove, and the course and distance entered on the log-board; and, in short, he is to see that the whole of the duties of the ship are carried on with the same punctuality as if the captain himself were present. In the absence of the captain the senior lieutenant is responsible for every thing done on board.

The master receives his orders from the captain, or any of the lieutenants. His more immediate duties are those of stowing the ship's hold, and of attending to her sailing qualities; of receiving and placing the provisions in the ship, so as most conveniently to come at those which may be wanted. He is to take care that the cables are properly coiled in the tiers. The keys of the spirit-room are in his custody, and he is directed to intrust them only to the master's mates. He has the charge of the store-rooms of the warrant-officers, which he is ordered frequently to visit; in short, the whole of the ship's provisions, water, fuel, and stores of every description, are under the superintendence of the master; and he is also intrusted, under the command of the captain, with the charge of navigating the ship, bringing her to anchor, ascertaining the latitude and longitude of her place at sea, surveying harbours, and making such nautical remarks and observations as may be useful and interesting to navigation in general.

The warrant-officers are charged with the duty of receiving on board from the dock-yards, and examining, the various stores of their respective departments, and keeping an account of the expenditure of them.

The gunner has the charge of the ship's artillery, and of the powder magazine. He is to see that the locks and carriages are kept in good order, and that the powder is preserved from damp; he is frequently to examine the musquetry and small arms, and to see that they are kept clean and fit for service; and, in preparing for battle, it is his duty to take care that all the quarters are supplied with every thing necessary for the service of the guns, and,

Personel.

Lieu-tenant.

Master.

Gunner.

Personel. during the action, that there be no want of ammunition served out. He is frequently to exercise the men at the guns, and to see that they perform this part of their duty with correctness, explaining and enforcing the necessity of their pointing the guns before they fire them, spunging them well, and close-stopping the touch-hole immediately after firing. The armourer and his mates are under the immediate orders of the gunner, in every thing that relates to the great guns and small arms.

Boatswain. The boatswain is charged with the duty of receiving and examining all the stores belonging to his department, consisting chiefly of the ropes and rigging, the latter of which he is ordered to inspect daily, in order that any part of it, chafed or likely to give way, may be repaired without loss of time. He is always required to be on deck at such times as all hands are employed; he is bound to see that the men, when called, move quickly upon deck, and when there, that they perform their duty with alacrity, and without noise or confusion. The sail-maker and the rope-maker are under his immediate orders; and he is directed to see that both these officers perform their respective duties with diligence and propriety.

Carpenter. The carpenter, when appointed to a ship, is carefully to inspect the state of the masts and the yards, whether in the dock-yard or on board of the ship, to see that they are perfectly sound and in good order. He is to examine every part of the ship's hull, magazine, store-rooms, and cabins. He is every day when at sea carefully to examine into the state of the masts and yards, and to report to the officer of the watch if any appear to be sprung, or in any way defective. He is to see that the ports are secure and properly lined, and that the pumps are kept in good order, as also the boats, ladders, and gratings. The caulker is placed under his immediate orders, and he is to see that the former performs his duty in a workmanlike manner, in stopping immediately any leaks that may be discovered in the sides or decks.

Purser. The purser has the charge of all the ship's provisions, and of the serving them out for the use of the crew. His charge is, therefore, of a most important nature; and, accordingly, he must not only produce good certificates of his conduct whilst serving in the capacity of clerk, but must also find two sureties for the due discharge of his trust, who are required to give bond in a penal sum, according to the rate or class of ship to which he may be appointed. The regulations and instructions for his guidance are minutely detailed in the general printed instructions, with all the various forms established for the keeping of his accounts with the comptroller of victualling, to whom he is immediately responsible. To assist him in the performance of his arduous duties, he is allowed to employ the clerk, who, being engaged by the captain, who is responsible for the strict performance of the duties of all the officers under his orders, is, as it were, a check on the purser in many parts of his duty, regarding the slop-books, muster-books, &c. He has also a steward under his immediate orders.

Physician. The duties of the physician to the fleet, the surgeon of a ship and his assistants, the secretary to the commander-in-chief, and the chaplain, are too obvious to require any specification.

Midshipmen. The midshipmen are considered as the principal petty officers, but have no specific duties assigned to them. In the smaller vessels, some of the senior ones are intrusted with the watch; they attend parties of men sent on shore; pass the word of command on board, and see that the orders of their superiors are carried into effect; and, in short, are exercised in all the duties of their profession, so as, after six years' service, to qualify them to become lieutenants.

Marines. Every ship, according to her class, has a certain num-

ber of marines serving on board as part of her complement. **Personel.** They are commanded by a captain, or brevet-major, in from first to fourth rates inclusive, with three or two subalterns under them, and an established number of non-commissioned officers; but the party on board fifth rates, and under, is commanded by a subaltern, and in small vessels by a sergeant or corporal.

All marine-officers, of whatsoever rank, when embarked, are to obey the orders of the captain, or the commanding officer of the watch. The marines are exercised by their officers in the use of their arms; they are employed as sentinels, and in all other duties on board of which they are capable, with the exception of going aloft. The officer commanding has the charge of the arms, accoutrements, and drums; and he is to inspect weekly, at least, the state of the clothing of his party. The marines are in every respect treated in the same manner as the rest of the ship's company.

The long continuance of the revolutionary war necessarily created a prodigious increase of the commissioned officers of the navy. Their numbers, in the five following years of peace, were,

	1793.	1803.	1815.	1821.	1836.
Admirals.....	11	45	70	63	43
Vice-admirals.....	19	36	73	59	59
Rear-admirals....	19	51	77	68	63
Captains.....	444	666	824	828	755
Commanders.....	160	410	762	776	823
Lieutenants.....	1408	2461	3211	3797	2976

The warrant-officers have increased in each class, from the average of about 400 in 1793, to 700 in 1821.

The number of seamen and marines voted in 1792 was 16,000 (but never reduced to that number); in 1822, it was 21,000; and in 1836, 32,000. The greatest number of seamen and marines voted in any one year during the war was 150,000.

The crew of a ship of war consists of able seamen, ordinary seamen, landsmen, boys, and marines. The landsmen, boys, and marines, are always entered voluntarily, the latter in the same manner as soldiers, by enlisting into the corps, the two former at some rendezvous, or on board particular ships. A supply of boys for the navy is also regularly sent from the Asylum at Greenwich and the Marine Society. Able and ordinary seamen also very commonly volunteer to serve during the war, and always in time of peace; but the high wages given by the merchant ships to seamen in time of war hold out such encouragement as to induce them to give the preference to that service, though, in all other respects, their treatment is far superior on board a king's ship, having better provisions, and being subject to much less fatigue and exposure to the weather. Indeed, the excellent regulations now rigidly adhered to on board his majesty's ships, and the attention that is paid to the health and comfort of the crew, have overcome much of that reluctance which formerly was felt to the service of a ship of war.

The state of health on board of a king's ship is, generally speaking, not exceeded in the most favoured spot on shore; and that horrible disease, the sea-scurvy, may now be considered as unknown in the British navy, since the universal introduction of lemon juice, or the citric acid, without an ample supply of which no ship is permitted to sail on a foreign voyage. Sir Gilbert Blane, in a sensible little tract on the Health of the Navy, says that he has never seen the scurvy resist the citric acid; and that, in the perusal of several hundreds of surgeons' journals, he has met with only two cases which seemed to resist it.

Personel. Yet, though it appears to have been known as a remedy for the scurvy, far superior to all others, two hundred years ago, it seems to have lain dormant and utterly neglected, till Dr Lind, more than a hundred years afterwards, revived and stated clearly the singular powers of this remedy. In 1600, Commodore Lancaster sailed from England, with three other ships, on the 2d of April, and arrived in Sal-danha Bay on the 1st of August. The commodore's crew having each had three table-spoonfuls of lemon juice every morning, arrived there in perfect health; whereas the other ships were so sickly, that they were unmanageable for want of hands. We have all felt the commiseration and horror which the perusal of the narrative of Anson's Voyage produces. His ship, the Centurion, left England with 400 men, of whom 200 were surviving on his arrival at Juan Fernandez, and of these, eight only were capable of duty, from scurvy. Yet even this horrible catastrophe seems to have failed in rousing the nation to have recourse to a remedy so certain and efficacious. Cook was well supplied with vinegar and other acids, and found the good effects of them; but the first general supply of lemon juice to the navy was established only in the year 1795, in consequence of a trial which had been made of it the preceding year in the Suffolk, of seventy-four guns. This ship left England, and arrived at Madras in September, without touching at any land. With every man's grog there were daily mixed two thirds of a liquid ounce of lemon juice, and two ounces of sugar. She lost not a man; and though the disease made its appearance in a few, an increased dose of lemon juice immediately removed it. Thus the Suffolk, after a voyage of 162 days, arrived without losing a man, or having a man sick of the scurvy; whereas the Centurion, in 143 days from the last place of her refreshment, lost half of her crew, whilst the other half were so feeble and emaciated as to be utterly helpless.

Nothing could more strongly point out the efficacy of lemon juice than the following fact. When Lord St Vincent commanded the fleet which blockaded Brest from the 27th of May to the 26th of September 1800, he maintained so close a blockade, that not a single day passed without reconnoitring the entrance of the harbour; yet, although the seamen of his fleet, consisting of at least 16,000 men, had no other than the ordinary ship's provisions, sixteen only, in the course of four months, were sent to the hospital. In 1780 the Channel fleet, as appears from Dr Lind, were so overrun with scurvy and fever as to be unable to keep the sea after a cruise of ten weeks only.

Progres-
sive dimi-
nution of
sickness.

From the official returns collected by Sir Gilbert Blane, M. Dupin, a French author well versed in naval subjects, has drawn out the following table, which exhibits at one view the progressive diminution of sickness, death, and desertion, in the British navy, calculated on 100,000 men.

Years.	Sick sent to Hospital.	Deaths.	Desertions.
1779	40,815	2654	1424
1782	31,617	2222	993
1794	25,027	1164	662
1804	11,978	1606	214
1813	9,336	698	10

Hence it would appear, that the diminution of sickness and of deaths has been in the proportion of four to one nearly between the years 1779 and 1813. The diminution of desertions from the hospital in the same period is not the less remarkable; and it affords, at the same time, the strongest proof of the progressive amelioration of the condition of seamen on board British ships of war. Indeed, whether on board of ship, or in any of those noble institutions, the naval hospitals, which are established at all

the principal ports at home, and in the colonies abroad, the attention which is paid to the sick sailor is above all praise. The seamen are sensible of this, and nothing keeps them back from volunteering their services, and giving a preference to a king's ship over a merchantman, but the temptation of high wages offered by the latter in time of war, and that love of liberty and free scope for roving which are characteristic of seamen.

The speedy manning of the fleet, on the first breaking out of the war, is one of the most important objects that can devolve on the naval administration, as on it alone must depend the safety of our commerce and our colonies. This has been felt at all times; and, accordingly, a variety of schemes have been brought forward for this purpose, but all of them have failed of success, except the compulsory mode of raising men under the authority of press-warrants, issued by the lords commissioners of the admiralty, by virtue of the king's order in council, renewed from year to year. There likewise issues, on the breaking out of a war, a proclamation from the king, recalling all British seamen out of the service of foreign princes or states; and the instructions to the commanders of all ships of war direct them to search foreign vessels, and to take British seamen out of them.

The impressment of seafaring men, however anomalous under a free constitution like that of Great Britain, is deemed sensible on state necessity, until it can be shown that the fleet, on an emergency, is capable of being manned without resorting to that measure. In consequence of some doubts being raised on the legality of the subject in the year 1676, when the affairs of the admiralty were managed immediately under the direction of the king and the great officers of state, a discussion was held on this point, when it was decided by the judges and crown-lawyers, that the king had an indefeasible right to the services of his subjects when the state required them, and that the power of impressing seamen was indispensably inherent in the crown, without which the trade and safety of the nation could not be secured. The first instance of impressing men in Ireland seems to have been in the year 1678, when the lord-lieutenant received directions from the privy council to raise a thousand seamen for the fleet. In 1690, the lords-justices of Ireland were directed to assist the officers of the navy in impressing men in that kingdom. In 1697, a register was taken of all the seafaring men in Ireland, which amounted to 4424 men, of whom it is noted 2654 were Catholics. On several occasions, during Queen Anne's reign, the lords-justices of Ireland received directions to raise men to serve in the fleet.

In Scotland, the mode of raising men by impressment was unknown before the union; but in various instances the council of Scotland was directed to raise volunteers for the fleet, each man to have forty shillings as bounty.

In 1706, an experiment was tried for the speedy manning of the fleet, by virtue of an act of parliament, which required the civil magistrates of all the counties to make diligent search for all seafaring men, and twenty shillings were allowed to the constables for each man taken up; the seamen to have pay from the day of delivery to the naval officers stationed to receive them; and if they deserted after that, they were to be considered as guilty of felony. By the same act, insolvent debtors, fit for the service, and willing to enter it, were released, provided the debt did not exceed L.30; and no seaman in the fleet was to be arrested for any debt not exceeding L.20. The whole proceeding under this act incurred a very heavy expense, and totally failed.

In the same year, the queen referred to the Prince of Denmark, then lord high admiral, an address from the House of Lords, relating to the three following points:—1st, The most effectual means for manning the fleet; 2d,

Personel.

Manning the fleet.

Impressment.

Personel. the encouragement and increase of the number of seamen; 3d, the restoring and preserving the discipline of the navy. His royal highness submitted these points to such of the flag-officers and other commanders as could be assembled, who made a report, of which the substance was to the following effect:—1st, To cause a general register to be kept of all seafaring men in England and Ireland, for which they presented the draft of a bill; 2d, that all marines qualified to act as seamen should be discharged from the army, the officers to have levy money and the men's clothing returned; 3d, that not fewer than 20,000 seamen should be kept in employ in time of peace. But they observe, that as to the restoring and preserving the discipline of the navy, no particular instance being laid before them wherein it was defective, they could give no opinion on that head.

Registry of seamen. This registry of seafaring men has been tried more than once; but as the men themselves had no interest whatever in the measure, it always failed in producing the desired effect. It is now under trial by act of parliament, with great inducements for men to register and enter the naval service.

In fact, there are now so many exemptions from the impress, that its severity is greatly abated. The following descriptions of persons are protected by various acts of parliament:

Masters of merchant ships or vessels.

First mates of such as are fifty tons or upwards.

Boatswains and carpenters of such as are of 100 tons or upwards.

Men belonging to vessels and craft of all kinds in the employment of navy, victualling, ordnance, customs, excise, and post offices.

Watermen belonging to the insurance offices within the cities of London and Westminster.

All men of the age of fifty-five years and upwards.

All youths not having attained the age of eighteen.

All foreigners.

Apprentices not having used the sea before the date of their indentures, and not more than three years from the said date.

Landsmen not having served at sea full two years.

Masters, apprentices, one seaman, and one landsman, of all fishing vessels on the sea coast or on navigable rivers.

Harpooners, line-managers, and boat-steerers of the Greenland fishery and the southern whale fishery; and all seamen and common mariners who have entered for the said fisheries.

And no person whatsoever can be impressed, except by an officer who has been intrusted with a press-warrant.

Discipline. The discipline of the navy, or the government of his majesty's ships, vessels, and forces by sea, is regulated by the act of 22 Geo. II., usually known by the name of the articles of war. By this act, the lords commissioners of the admiralty are empowered to order courts-martial for all offences mentioned therein, and committed by any person in and belonging to the fleet and in full pay; and also to delegate the same power to admirals commanding in chief on foreign stations, which power also may devolve on his successor in case of death or recall, provided that no commander-in-chief of any fleet or squadron, or detachment thereof, consisting of more than five ships, shall preside at any court-martial in foreign parts, the officer next in command being ordered to preside thereat.

Courts-martial. By this act, no court-martial can consist of more than thirteen or of less than five persons, to be composed of such flag-officers, captains, or commanders, then and there present, as are next in seniority to the officer who presides at the court-martial. And when there are but three officers of the rank of captains, the president is to call in as many commanders under that rank as will make up five in the whole.

This code of laws for the government of the fleet consists of thirty-six articles, of which nine award the punishment of death, and eleven death or such other punishment as the court-martial shall deem the offence to deserve. Those which incur the former penalty are, the holding illegal correspondence with an enemy; cowardice or neglect of duty in time of action; not pursuing the enemy; desertion to the enemy; making mutinous assemblies; striking a superior officer; burning magazines, vessels, &c. not belonging to an enemy; murder; sodomy. The penalty of death for cowardice, or other neglect of duty, in time of action (art. 12), and of not pursuing the enemy (art. 13), was, by the 19th George III. so far mitigated, as to authorize the court-martial "to pronounce sentence of death, or to inflict such other punishment as the nature and degree of the offence shall be found to deserve." Under these articles thus mitigated, Admiral Byng would probably not have been condemned to death. The other eleven articles, which leave the punishment to the discretion of the court, are, not preparing for fight, and encouraging the men in time of action; suppression of any letter or message sent from an enemy; spies delivering letters, &c. from an enemy; relieving an enemy; disobedience of orders in time of action; discouraging the men on various pretences; not taking care of and defending ships under convoy; quarrelling with and disobeying a superior officer in the execution of his office; wilfully neglecting the steering of ships; sleeping on watch, and forsaking his station; robbery. The remaining sixteen articles incur the penalty of dismissal from the service, or from the ship, degradation of rank, or such other punishment as the court may judge the nature and degree of the offence to deserve.

Much, however, of the internal discipline of a ship of war depends upon the captain, who, being empowered to punish the men for minor offences, according to the usage of the service, courts-martial on seamen are rarely found necessary to be resorted to in well-regulated ships. The principal circumstance which usually militates against the perfect good order of the crew, is the great allowance of grog served out daily to the men, as established by the king's order in council, and which frequently leads to drunkenness, and this again to insubordination. Perhaps half the punishments in the navy are for this offence, which it requires the utmost vigilance and precautions on the part of the officers to prevent.

In other respects the discipline of a well-organized ship of war is perfect; and to this discipline M. Dupin, a French writer of great sagacity, mainly ascribes the brilliant successes of the British navy, and to the want of it the ruin of that of France. "We have already cited," says he, "as a model, the management of the *matériel* of the English ships. In the preservation of this *matériel*, in the stowing it away, in the arrangement of whatever may be necessary either for manœuvres or for action, the most perfect regularity is observed. At the same time, what becoming austerity is maintained by the commanding officer; what obedience amongst the subalterns; and, in a space so limited, considering the number of men on board, and the multiplicity of movements they have to make in obeying so many different orders, what imposing silence. It is the calmness of strength, the presiding influence of wisdom. In the midst of the most complicated operations, and even in the heat and transport of battle, one hears only the words of command, pronounced and repeated from rank to rank, with a measured tone and perfect *sang froid*. No unseasonable advices, no murmurs, no tumult. The commanders meditate in silence; the word is given, and the men act without either speaking or thinking."

This is remarkably so in the day of battle. Every officer and man knows precisely his place, and the duty he has to perform, on that day. By the general printed in-

Personel.
Articles of war.

Petty punishment.

Effects of discipline.

Personel. instructions, the captains of his majesty's ships are required to accustom the men to assemble at their proper quarters, to exercise them at the great guns, to teach them to point, fire, &c. under all circumstances of sea and weather. Indeed, it is well known, that the preservation of the high character of the British navy essentially depends on the proper training of the seamen to the expert management of the guns, so as to be duly prepared in the day of battle; the issue of which so mainly depends on the cool, steady, and regular manner in which the ship's ordnance is loaded, pointed, and fired. Practice in these respects is much more necessary on board ships than on shore, as it can never happen that the ship is entirely steady, and has most frequently a rolling or pitching motion, for which allowances must be made, and which can only be made with effect by long practice.

Naval tactics. If the management of the great guns of a ship of war is more difficult than the artillery of a fort, so likewise are naval tactics more difficult than those of an army; inasmuch as there is more difficulty and less dependence in placing and directing the movements of an inanimate than an animate machine. The general principles are the same; the object of both being that of bringing the greatest possible force to bear on that point which is likely to produce the greatest possible injury to the enemy. With this view, as well as to keep a fleet together in compact order, so that straggling ships may not be cut off by the enemy, it has been found necessary to preserve a certain order of sailing, whether out of sight of an enemy or in his presence; and such an order as, according to the state of the wind and weather, and the point of bearing of the enemy's fleet, may most conveniently and expeditiously be changed into such a line of battle as the commander-in-chief may deem it most expedient to adopt in the attack to be made on his opponent.

In order to do this, it is obvious that every individual captain must be able to know, under all circumstances, what the ship he commands will be able to do, in order to preserve her station in the fleet; for it is with ships as with horses, no two perhaps performing the same evolution with the same tightness of rein, or the same quantity of sail. This shows the absolute necessity of a commander-in-chief frequently exercising his fleet in naval tactics, and to observe how such and such a ship will behave under a certain quantity of canvass, and to assign her station in the line where she may appear calculated to act with the greatest efficiency.

To facilitate these movements, the admirals commanding squadrons are considered as responsible for the movement of the ships in their respective divisions. They are to see that each captain strictly obeys the general order; and if any one is perceived to neglect his duty, whether belonging to his proper division or not, if in action, he has the power to send immediately another officer to suspend him. And in order that no confusion may arise, if, in time of battle, the admiral commanding in chief, or any of the admirals commanding squadrons, should be killed, his or their flags remain flying till the battle is decided. If the commander-in-chief be killed or severely wounded, a private signal is made to the second in command; or if a junior admiral be killed or wounded, the commander-in-chief is also acquainted by signal.

Code of naval signals. This silent method of communicating what is going on is the perfection of naval tactics; indeed it is very difficult to conceive how our ancestors contrived to manage a fleet without a code of signals. For great and important occasions, the exhibition of a flag or flags, in some particular part of the ship, might be generally understood to imply that the fleet should anchor, or tack, or form the order of sailing in two lines, or the line of battle, or some other great movement. The hoisting of a cask at the

yard-arm might be understood to imply a want of water; or a hatchet, of wood; or an empty bag, of bread; and the table-cloth was a very significant invitation to dinner; but they had no means of interchanging freely their wants or intentions, or of conveying detailed intelligence. Even so late as the American war, there was no established code of signals in the navy. An anecdote is told of Admiral Geary, who, in the year 1780, commanded the Channel fleet, which clearly proves how little was then known or practised in the way of signals. His captain, Kempenfelt, had laboured long to improve the defective system; and having one day seen the enemy's fleet, he endeavoured to communicate the intelligence by the new code; but in the hurry of making sail and giving chase, the signals somehow or other were not understood by the rest of the fleet. Geary at last became impatient, and, running up to Kempenfelt, seized him by the hand, and exclaimed with great emphasis, "Now, my dear Kempy, do, for God's sake, throw your signals overboard, and make the old one, which we all understand,—to bring the enemy to close action."

"If an admiral," says Dr Beatson in his able Memoirs, "cannot command all the necessary movements of his ships by signal in the day of battle, he is not upon a footing with an enemy who possesses that advantage; and, even with better ships and better men, and more experienced commanders, he may be foiled in his expectations of victory, if not defeated, from his want of the means to direct and to perform the necessary evolutions of his fleet." "In no fight," he adds, "was the insufficiency of the present system of naval signals more conspicuous than in this (Keppel's unfortunate action); and it is to be hoped that if ever a new code be adopted for the use of the royal navy, it may be so clear and comprehensive, that such fatal errors as those which have been pointed out will in future be prevented." This, we may now say, has been accomplished.

The idea of *numbering* the flags, and of assigning a certain number of corresponding sentences to certain combinations of these numbers, was reduced to something approaching a regular system in the fleet under the command of Lord Howe; and in the year 1798 a new signal-book was issued from the admiralty, containing about 400 sentences, expressive of certain operations of a fleet, communicated by means of flags to which the numerical characters were applied; and these, as far as they went, answered very well, but did not supersede the necessity of conveying orders by boats on many occasions. The following year Sir Home Popham suggested the idea of making the flags to represent the letters of the alphabet in combination with numbers, which not only added immensely to the means of communication, but also of making use of words by signal. From this time improvements in the modes of communicating by signals and telegraphs were rapidly introduced, particularly in the shape and the colours of the flags, according to a plan of Sir Home Popham, which has rendered signals by flags as nearly perfect as they probably ever will be.

There is, however, an imperfection in the flags themselves; as in calm weather, when they do not fly out, neither their shape nor colour is visible without the use of stretchers, which are not always easily managed, and never without loss of time. Again, if the wind be parallel to the line of vision, the flag shows only its edge, and neither shape nor colour can be discerned. To remedy these inconveniences, Sir Home Popham proposed a portable wooden semaphore, in imitation of the French telegraph, to be mounted on the quarter-deck or poop of a ship.

It consists of two posts, each having a moveable arm, which may be placed in four positions that can never be mistaken, being at right angles to each other; and the

Personel.

Sea-telegraph.

Personel. number annexed to each position is that which it conveys to the person receiving the message.

Improve-
ment in
navigation. The encouragement afforded by government to every branch of science connected with the navy, and navigation in general, has been carried much farther by England than by any other European nation, and has produced the happiest results for commercial enterprise, by determining with accuracy the precise position of ships, by shortening long voyages, and by the discovery of new lands and unexplored regions. From the commencement of the eighteenth century, when a national reward was first offered to the man of science, or the artist, who should discover a method sufficiently exact to determine the longitude of a ship's place at sea, to the present time, the improvements in the construction and division of all kinds of instruments for measuring angles, in the calculations of lunar and other tables, and, above all, in the manufacture and adjustments of chronometers, have continued in gradual progression, and may now be considered as having arrived at such a degree of perfection, more especially the chronometers, that the discovery of the longitude can scarcely be said to remain a desideratum. We may form an idea what the progress in the improvement of chronometers has been, when a public reward was offered by parliament in the year 1814, to the first who should determine the longitude at sea *within a degree*; and in 1820, three chronometers, after remaining in the arctic regions for eighteen months, returned to England without altering their rates more than a few seconds of time.

Increase of
science in
the navy. The officers of the royal navy are much more generally versed in the sciences of late years than they were heretofore. In fact, it is now necessary for a young man to be well

acquainted with a certain portion of mathematical and astronomical knowledge, to enable him to pass an examination, without which he cannot be qualified for the commission of a lieutenant. The examinations also of the several warrant-officers, and their qualifications for their respective stations, are more strictly attended to than heretofore; and the consequence is, that a much better system of discipline without rigour is established throughout the fleet, and more comfort in every respect to every class of officers and men employed.

The encouragement given to the navy from its first regular establishment has marked it as a favourite service in the minds of the public. The sea-pay, the half-pay, and other emoluments, have generally been superior to those enjoyed by the army, but subject to great fluctuations in every reign, and to frequent changes in the same reign. Thus King William, in 1693, gave to an admiral L.4 a day, a vice-admiral L.3, and a rear-admiral L.2, which, with the compensation for servants, amounted to more than their present pay; yet their allowances were still further increased in 1700, till a reduction took place in consequence of an address from the Commons. From this time till the year 1806 very little alteration took place, when a small addition was made to the pay of each class.

The following table will exhibit, at one view, the complete war-establishment of commissioned, warrant, petty, and non-commissioned officers, seamen, and marines, on board every class of his majesty's ships, with the rate of pay granted to each, and the classes into which they are divided for the distribution of prize-money or seizures; as established by his majesty's order in council of the 25th November 1816.

FLAG PAY.

Admiral of the fleet.....	L.6	0	0	} Sea-pay <i>per diem</i> , besides which every commander-in-chief receives a further sum of L.3 <i>per diem</i> whilst his flag may be flying within the limits of his station.
Admiral.....	5	0	0	
Vice-admiral.....	4	0	0	
Rear-admiral, or commodore with captain under him.....	3	0	0	
Captain of the fleet.....				

In flag-ships all the lieutenants, including one extra as flag-lieutenant, are allowed 6d. *per diem* in addition to their pay.

Classes for Distribution of Seizures.					
II.	Physician to the fleet, of less than three years' service as such.....	L.1	1	0	<i>per diem</i> .
	Physician to the fleet, of more than three and less than ten years' service.....	1	11	6	do.
	Physician to the fleet, of more than ten years' service.....	2	2	0	do.
	Master of the fleet.....	15	7	0	<i>per mensem</i> .
III.	Secretary to the admiral of the fleet.....	38	7	0	do.
	Secretary to an admiral commander-in-chief.....	30	13	8	do.
	Secretary to a vice or rear admiral commander-in-chief.....	23	0	4	do.
	Secretary to a junior flag-officer or commodore.....	11	10	0	do.
IV.	Two clerks to secretaries of commanders-in-chief, each.....	4	12	0	do.
	One clerk to secretaries of junior flag-officers or commodores.....	3	16	8	do.
	Admiral's coxwain.....	2	9	0	do.
VII.	Steward.....	*			
	Cook.....				
	Domestics.....				
		1	12	0	do.
* The numbers of these ratings to be					
		Admiral of the fleet.....	12		
		Admiral.....	10		
		Vice-admiral.....	7		
		Rear-admiral, or commodore with captain under him.....	5		
		Captain of the fleet.....	3		

Classes for Dis- tribu- tion of Seizures in Ships and Sloops.	RANKS AND RATINGS.	1st Rate.			2d Rate.			3d Rate.			4th Rate.		
		No.	Pay per Month.			No.	Pay per Month.			No.	Pay per Month.		
I.	Captain.....	1	L.	s.	d.	1	L.	s.	d.	1	L.	s.	d.
	1st Lieut. if of 7 years standing.....	8	61	7	4	1	53	14	0	1	46	0	8
II.	All others.....	8	11	10	0	7	11	10	0	6	11	10	0
	Master.....	1	9	4	0	1	9	4	0	5	9	4	0
	2d Master.....	1	13	0	8	1	12	5	4	1	11	10	0
	Chaplain.....	1	5	7	4	1	5	7	4	1	5	7	4
	Purser.....	1	12	5	4	1	12	5	4	1	12	5	4
	Surgeon (for pay see note at the end of this table).....	1	5	7	4	1	4	12	0	1	4	4	4
III.	Gunner.....	1				1				1			
	Boatswain.....	1	7	13	4	1	6	18	0	1	6	2	8
	Carpenter (with 7s. per month addi- tional for tools in every rate).....	1				1				1			
	Master's mate, if passed.....	6	4	12	0	4	4	4	4	3	4	4	4
	Master's mate, not passed.....	6	3	16	8	4	3	9	0	3	3	1	4
	Midshipman, if passed.....	24	3	16	8	20	3	9	0	16	3	9	0
	Midshipman, not passed.....	24	2	13	8	20	2	6	0	16	2	6	0
	Assistant surgeon (for pay see note)...	3				3				2			
	Clerk.....	1	4	12	0	1	4	4	4	1	4	4	4
	Schoolmaster.....	1				1				1			
	Master at arms.....	1				1				1			
	Armourer.....	1				1				1			
	Caulker.....	1				1				1			
	Ropemaker.....	1	2	10	0	1	2	8	0	1	2	6	0
	Sailmaker.....	1				1				1			
IV.	Carpenter's mate (with 7s. per month additional for tools in every rate)....	2				2				2			
	Gunner's mate.....	5				4				3			
	Boatswain's mate.....	8				7				6			
	Ship's corporal.....	2				2				2			
	Quartermaster.....	12				12				9			
	Captain's coxswain.....	1	2	4	0	1	2	3	0	1	2	1	0
	Coxswain of the launch.....	1				1				1			
	Coxswain of the pinnace.....	1				1				1			
	Yeoman of the signals.....	1				1				1			
	Captain of the hold.....	1				1				1			
	Captain of the forecastle.....	3				3				3			
	Cooper.....	1				1				1			
	Armourer's mate.....	2	2	4	0	2	2	3	0	2	2	1	0
	Caulker's mate.....	1				1				1			
	Sailmaker's mate.....	1				1				1			
V.	Captain of the foretop.....	3				3				3			
	Captain of the maintop.....	3	1	19	0	3	1	18	0	3	1	17	0
	Captain of the afterguard.....	3				3				3			
	Captain of the mast.....	3				3				3			
	Ship's cook.....	1	2	11	6	1	2	11	6	1	2	11	6

5th Rate.				6th Rate.				Sloops.				Bombs.				Gun Brigs.				Schooners & Cutters.				Classes for Dis-tribution of Seizures in Brigs, Schoon-ers, and Cutters.
								100 Men & upwards.		Under 100 Men.														
No.	Pay per Month.			No.	Pay per Month.			No.	Pay per Month.			No.	Pay per Month.			No.	Pay per Month.			No.	Pay per Month.			
	L.	s.	d.		L.	s.	d.		L.	s.	d.		L.	s.	d.		L.	s.	d.		L.	s.	d.	
1	30	13	8	1	26	17	0	1	23	0	4	1	23	0	4	1	23	0	4					
4	9	4	0	3	9	4	0	2	9	4	0	2	9	4	0	1	11	10	0	1	11	10	0	I.
1	9	4	0	1	8	8	0	1	7	13	4	1	7	13	4	1	7	13	4	1	7	13	4		II.
1	4	12	0	1	4	12	0																	
1	12	5	4	1	12	5	4	1	3	16	8	1	3	16	8	1	3	16	8					
1	4	4	4	1	3	16	8	1	3	16	8	1	3	16	8	1	3	16	8					
1				1				1				1				1								
1				1				1				1				1								
1				1				1				1				1								
1	4	19	8	1	4	12	0	1	4	12	0	1	4	12	0	1	4	12	0					
1				1				1				1				1								
2	3	9	0	2	3	9	0	1	3	9	0	1	3	9	0	1	3	9	0	1	3	9	0	III.
1	2	13	8	1	2	13	8	1	2	13	8	1	2	13	8	1	2	13	8	1	2	13	8	
1	3	1	4	1	3	1	4	2	3	1	4	2	3	1	4	1	3	1	4	1	3	1	4	
1	1	18	4	1	1	18	4	1	1	18	4	1	1	18	4	1	1	18	4	1	1	18	4	
1				1				1				1				1				1				
1	3	9	0	1	3	9	0	1	3	9	0	1	3	9	0	1	3	9	0	1	3	9	0	
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1				1				1				1				1				1				
1				1				1				1				1				1				
1	2	2	0	1	2	0	0	1	1	19	0	1	1	19	0	1	1	19	0					
1				1				1				1				1				1				
1				1				1				1				1				1				
1				1				1				1				1				1				
2				2				2				2				2				2				
3				1				1				1				1				1				
2				3				3				2				2				1				
5				1				1				1				1				1				
1	1	17	0		1	15	0		1	15	0		1	15	0		1	15	0		1	15	0	IV.
1																								
1				2				2				1				1								
1				1				1				1				1				1				
1	1	17	0		1	15	0		1	15	0		1	15	0		1	15	0		1	15	0	
1				1				2				1				1								
2				2				2				1				1								
2	1	15	0		1	14	0		2	1	14	0		1	1	14	0		1	1	14	0	V.	
2				2				1				1				1								
2				2				1				1				1								
1	2	11	6	1	2	10	6	1	2	10	6	1	2	10	6	1	2	10	6	1	2	10	6	

Classes for Distribution of Seizures in Ships and Sloops.	RANKS AND RATINGS.	1st Rate.			2d Rate.			3d Rate.			4th Rate.						
		No.	Pay per Month.			No.	Pay per Month.			No.	Pay per Month.			No.	Pay per Month.		
VI.	Volunteer, 1st class.....	8	L.	s.	d.	7	L.	s.	d.	6	L.	s.	d.	4	L.	s.	d.
	Gunner's crew.....	25	} 1 14 0			22	} 1 14 0			20	} 1 14 0			13	} 1 14 0		
	Carpenter's crew (with 7s. per month additional for tools in every rate).....	18				16				14				12			
	Sailmaker's crew.....	2				2				2				2			
	Cooper's crew.....	2				2				2				2			
	Able seaman.....	} L.1. 12s. in all Rates.															
	Gunner's yeoman.....																
	Boatswain's yeoman.....																
	Carpenter's yeoman.....																
	Ordinary seaman.....	} L.1. 4s. in all Rates.															
Cook's mate.....																	
Barber.....	} L.1. 12s. in all Rates.																
Purser's steward (in vessels in which a purser is allowed).....																	
Captain's steward.....																	
Captain's cook.....																	
Ward or gun-room steward.....																	
Ward or gun-room cook.....	} L.1. 1s. in all Rates.																
Steward's mate.....																	
Landman.....																	
The numbers included in these ratings are, in																	
VIII.	Boy, 2d class.....	13	0	12	3	12	0	12	3	10	0	12	3	7	0	12	3
	Ditto, 3d class.....	18	0	10	9	17	0	10	9	16	0	10	9	11	0	10	9
	Widow's men.....	9	1	12	0	7	1	12	0	6	1	12	0	5	1	12	0
	Total.....	207				188				166				126			

5th Rate.			6th Rate.			Sloops.						Bombs.			Gun Brigs.			Schooners & Cutters.			Classes for Dis- tribution of Seizures in Brigs Schoon- ers, and Cutters.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																								
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1st Rates.....				1st Class.....				533	2d Class.....				483	3d Class.....				433	1st Class.....				362	2d Class.....				312	2d Rates.....				1st Class.....				359	2d Class.....				309	3d Rates.....				1st Class.....				264	2d Class.....				164	4th Rates.....				1st Class.....				144	2d Class.....				124	5th Rates.....				1st Class.....				63	2d Class.....				33	3d Class.....				13	6th Rates.....				1st Class.....				50	2d Class.....				40	3d Class.....				36	4th Class.....				16	5th Class.....				30	20				Sloops, Brigs, &c.				6				0	12	3	5	0	12	3	4	0	12	3	2	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3	1	0	12	3

Personel.

Classes for Dis-tribution of Seizures in Ships and Sloops.	RANKS AND RATINGS.	Number in each Rate.											Pay of Marines in all Rates.	Pay of Marine Artillery.	
		1st Rate.	2d Rate.	3d Rate.	4th Rate.	5th Rate.	6th Rate.	Sloops 100 Men and upwards.	Ditto under 100 Men.	Bombs.	Gun-Brigs.	Schooners and Cutters.			
MARINES.															
II.	Captain..... } Ditto if brevet-major..... }	1	1	1	1	...	...	...	...	...	...	...	{ 14 14 10 17 10 10	15 8 0 18 4 0	
III.	1st Lieutenant. Ditto after 7 years..... } Ditto under 7 years..... } 2d Lieutenant..... }	3	3	2	1	2	1	...	...	1	...	...	{ 10 10 7 9 2 4 7 7 5	10 19 4 9 11 4 7 16 4	
IV.	Serjeant..... } Ditto if colour serjeant... }	4	3	3	2	2	1	1	1	1	1	1	{ 1 18 1 2 12 1	2 16 9 3 10 9	
V.	Corporal. Ditto after 14 years..... } Ditto from 7 to 14 years.. } Ditto under 7 years..... }	4	3	3	2	1	1	1	1	1	1	1	{ 1 10 1 1 7 9 1 5 5	2 14 0 2 11 8 2 9 4	
VI.	Drummer.....	2	2	2	1	1	1	1	...	...	...	...	1 1 4	1 4 5	
	Bombardier. Ditto after 14 years..... } Ditto from 7 to 14 years.. } Ditto under 7 years..... }	...	...	...	...	...	...	...	...	1	...	...	...	{ 2 9 6 2 7 2 2 4 10	
	Private or gunner. Ditto after 14 years..... } Ditto from 7 to 14 years } Ditto under 7 years..... }	146	138	114	53	44	21	17	10	10	10	10	{ 1 1 6 0 19 2 0 17 5	1 9 1 1 6 9 1 4 5	
	Total marines...	160	150	125	60	50	25	20	12	14	12	12			

Note.—To this table it may be added, that captains who, on the death or absence of a commander-in-chief, are authorized to hoist a distinguishing pendant, are entitled to receive the pay of L.1 per day in addition to their pay as captains, while the pendant is flying within the limits of the station.

Surgeons of Ships in Active Service.

Under 6 years service.....	10s. a day.
After 6 ditto.....	11s. do.
— 10 ditto.....	14s. do.
— 20 ditto.....	18s. do.

Surgeons in Receiving-Ships, Prison-Ships, &c.

In harbour-duty.....	10s. a day.
Surgeons of hospital-ships.....	15s. do.
Assistant-surgeons.....	6s. 6d. do.

Establishment of half-pay.

Though the navy, as we have seen, was put upon a regular establishment under the reign of Henry VIII., neither officers nor seamen received any pay or emolument in time of peace, until the reign of Charles II., when, in 1668, certain allowances were made to flag-officers and their captains out of the L.200,000 a year voted for the whole naval service; and in 1674, certain other allowances were granted, by order in council, to captains who had commanded ships of the first and second rate, and to the second captains to flag-officers, on the ground, as assigned in the preamble, that they had undergone the brunt of the war, without sharing in the incident advantages of it, as prizes, convoys, and such like, which the commanders of the smaller classes of ships had enjoyed. But the first regular establishment of half-pay for all flag-officers, captains, first-lieutenants, and masters, was by King William,

in the year 1693, provided they had served a year in their respective qualities, or had been in a general engagement with the enemy. A regular established half-pay was further sanctioned by an order in council of Queen Anne in 1700; the conditions of which were, that no officer should enjoy the benefit thereof who had absented himself without permission of the lord high admiral or lords commissioners of the admiralty, or who had been dismissed for any misdemeanour, or by court-martial, or who had not behaved himself to the satisfaction of the lord high admiral, or who should have leisure to go out of his majesty's dominions, if employed in the merchant service or otherwise, or who enjoyed the benefit of any public employment. Since the above period the rate of half-pay to the several officers of the navy has undergone various modifications. At present it stands thus:

Personel.

RATES OF HALF-PAY.

Flag-Officers.

	Per	Diem.	
Admirals of the fleet.....	L.3	3	0
Admirals.....	2	2	0
Vice-admirals.....	1	12	6
Rear ditto.....	1	5	0

Captains.

To each of the first 100 as they stand on the } general list of officers in seniority.....	0	14	6
To each of the next 150.....	0	12	6
To the rest.....	0	10	6

Commanders.

To each of the first 150 on the list.....	1	10	0
To the remainder.....	0	8	6

Lieutenants.

To each of the first 300 on the list.....	0	7	0
To each of the next 700.....	0	6	0
To the remainder.....	0	5	0

Royal Marines.

Colonels.....	0	14	6
Lieutenant-colonels.....	0	11	0
Majors.....	0	9	6
Captains.....	0	7	0
First lieutenants of seven years standing.....	0	4	6
The rest.....	0	4	0
Second lieutenants.....	0	3	0

Masters.

To the first 100 on the list (being qualified for } first or second rates).....	0	7	0
To the next 200 (being qualified for third or } fourth rates.....	0	6	0
The remainder having served five years in the } navy, two of which as acting or second mas- } ter, or as master's mate or midshipman.....	0	5	0

*Medical Officers.**Physicians.*

After ten years service.....	1	1	0
After three years.....	0	15	0
Under that time.....	0	10	6

Surgeons.

Six years service.....	0	6	0
Under that time.....	0	5	0

Assistant Surgeons.

Three years service.....	0	3	0
Two years.....	0	2	0
Dispensers.....	0	5	0

Chaplains.

After eight years service at sea, or ten in harbour	0	5	0
For less service, not under three years.....	{ a proportion of the above.		
For each year's longer service than ten } years, 6d. per diem additional till it reach }	0	10	0

Pursers.

To the first 100 on the list.....	0	5	0
Do. next 200 do.....	0	4	0
The remainder.....	0	3	0

Payable quarterly.

The boatswains, gunners, and carpenters of the navy, have pensions or superannuations, in lieu of half-pay, according to the following scale, formed on a consideration of the total length of service as warrant-officers, with the length of service in commission.

Total Service.	Commissioned Service.	Pension.
Years.	Years.	L.
30.....	20.....	85
30.....	15.....	75
30.....	10.....	65
30.....	5.....	55
20.....	20.....	75
20.....	15.....	65
20.....	10.....	55
20.....	5.....	45
15.....	15.....	60
15.....	10.....	50
15.....	5.....	40
10.....	10.....	45
10.....	5.....	35

In point of half-pay and other pecuniary emoluments, the navy has much the advantage over the army, more particularly in the chance of prize-money, which but seldom falls to the share of the army, except on some conjoint expedition. On the commencement of a war a proclamation is issued by the king, directing that the net produce of all prizes taken by any of his ships of war shall be for the entire benefit and encouragement of the flag-officers, captains, commanders, and other commissioned officers, and of the seamen, marines, and soldiers on board at the time of the capture; and directing also in what manner the distribution shall be made. Many very handsome, and, in some instances, very splendid fortunes, have been made by captures of the enemy's ships.

Another great encouragement for young men to enter the naval service arises from the honours bestowed by the sovereign for any brilliant exploit. Thus, in consequence of the skill and bravery which were exhibited in the great and glorious action of the 1st of June 1794, his majesty was graciously pleased to confer on Earl Howe the order of the garter; Admirals Graves and Sir Alexander Hood were made barons of the kingdom of Ireland; and Rear-admirals Bowyer, Gardner, and Pasley, together with Sir Roger Curtis, captain of the Queen Charlotte, were created baronets. Gold medals and chains were also distributed to such admirals, and gold medals to such captains, as were particularized in Lord Howe's despatches. The first lieutenants of each ship were promoted to the rank of commanders; and pensions of L.1000 per annum were granted to Rear-admirals Bowyer and Pasley, in consideration of the loss of limbs.

For the action of 14th of February 1797, Lord St Vincent was advanced to the dignity of an earl, and a pension was granted to him of L.3000 a year; Vice-admirals Thompson and Parker were created baronets; Commodore Nelson received the order of the bath, and Captain Calder of the Victory the honour of knighthood; and gold medals were distributed to the admirals and captains.

For the action of the 11th of October 1797, Admiral Duncan was created a viscount, with a pension of L.2000 a year; Vice-admiral Onslow was made a baronet; and Captain Fairfax had the honour of knighthood. Gold medals were also distributed to the admirals and captains.

For the action of the 1st of August 1798, his majesty was pleased to testify his sense of the importance of this brilliant achievement, by raising Sir Horatio Nelson to the dignity of the peerage, by the title of Baron Nelson of the Nile; and by directing medals to be distributed to the captains. The first lieutenant of the Majestic was made a captain, and the first lieutenants of the other ships were

Personel.

Personel. promoted to the rank of commanders. And for the attack of the Danish fleet at Copenhagen, Lord Nelson was raised to the dignity of a viscount, and the order of the bath was conferred on Admiral Graves.

For the ever memorable action of Trafalgar, in which Lord Nelson fell in the arms of victory, his majesty was pleased to confer upon his brother the rank of earl, with a pension of L.5000 a year; and the sum of L.120,000 was voted by parliament for the purchase of an estate to be annexed to the title. Admiral Collingwood was raised to the dignity of baron; Lord Northesk was honoured with the order of the bath, and Captain Hardy was created a baronet. The captains received medals; five lieutenants were made captains, and twenty-four, commanders; twenty-two midshipmen were made lieutenants; and the senior captain of marines was made brevet-major.

By this last act of Lord Nelson's life was annihilated the only remaining hope of the combined navies of France and Spain, and a blow given to the naval power of the enemies of Great Britain, which they never recovered during the remainder of the war.

In the secondary victories of Sir John Warren, Sir John Duckworth, Sir Robert Calder, Sir Richard Strachan, Lord Gambier, and Lord Exmouth, and even for brilliant actions of single ships, appropriate distinctions have never been withheld. Exclusive of peerages and baronetcies, the honours bestowed for gallant conduct in the naval service consist of twenty-five grand crosses of the bath, seventy knights commanders, and 130 companions of the bath.

Pensions for wounds. The provision which is made for officers, in the event of losing a limb, or being so severely wounded in the service that the prejudice to the habit of body is equal to the loss of a limb, is another encouragement for entering the naval service.

For an admiral, from L.300 to L.700 per annum.

A captain, wounds, L.250; loss of a limb.....L.300

Commander....do... L.150; do.....L.200

Lieutenant.....do... L.91. 5s.; do.....L.91. 5s.

Marine officers the same as in the army.

Widows' pensions. A provision is likewise made for the widows of the commission and warrant officers of his majesty's navy, by order of the king in council, and voted annually on the navy estimates. The pensions are allowed according to the annexed scale, being similar in most cases to the widows of officers in the army of corresponding ranks. The latter are also provided for by an annual vote of parliament.

Scale of Pensions.

The widow of a flag-officer of his majesty's fleet.....	L.120	0	0
— of a captain, superannuated with the rank of rear-admiral.....	100	0	0
— of a captain of three years standing.....	90	0	0
— of a captain under three years standing.....	80	0	0
— of a commander.....	70	0	0
— of a lieutenant, superannuated with the rank of commander.....	60	0	0
— of a lieutenant.....	50	0	0
— of a master.....	40	0	0
— of a surgeon.....	40	0	0
— of a purser.....	30	0	0
— of a boatswain.....	25	0	0
— of a gunner.....	25	0	0
— of a carpenter.....	25	0	0
— of a second master of a yacht, or master of a naval vessel warranted by the navy board.....	25	0	0

And the widows of officers of the royal marines are entitled to the following pensions: **Personel.**

	Per Annum.
The widow of a general officer.....	L.120 0 0
Ditto colonel.....	90 0 0
Ditto lieutenant-colonel.....	80 0 0
Ditto major.....	70 0 0
Ditto captain.....	50 0 0
Ditto first lieutenant and surgeon	40 0 0
Ditto second lieutenant and assistant surgeon.....	20 0 0

In addition to these pensions, there has been established a *Compassionate Fund*, for the relief of such widows and orphan children as may appear to be proper objects of compassion. The sums annually required are voted by parliament, and at present are limited to L.14,000 a year. **Compassionate fund.**

Pensions to petty officers and seamen are granted by the board of admiralty for wounds, infirmities, and length of service; and the sum required for this purpose is voted annually on the navy estimates.

The establishment of Greenwich Hospital embraced much more extensive objects. The first idea of this noble institution, the glory and ornament of the kingdom, has been ascribed, with every appearance of justice, to Mary, the consort of William III. Being desirous that our gallant seamen, worn down by age or infirmities, as well as suffering from wounds, should not be left destitute, she made a grant, jointly with King William, of the palace of Greenwich, and of certain lands adjoining, to be appropriated to this purpose, in order, as stated in the king's commission, to "the making some competent provision, that seamen, who, by age, wounds, or other accidents, shall become disabled for further service at sea, and shall not be in a condition to maintain themselves comfortably, may not fall under hardships and miseries, but may be supported at the public charge; and that the children of such disabled seamen, and also the widows and children of such seamen as shall happen to be slain in sea service, may, in some reasonable manner, be provided for and educated." In 1695, the committee appointed to examine and report on the premises recommended an additional wing to King Charles's building, which being approved by the king, Sir Christopher Wren undertook to superintend the new erections without any pay or reward. Since that time various additions and improvements have been made to this magnificent pile of building, which was completed very nearly as it now appears, in the year 1778. **Greenwich Hospital.**

The king granted L.2000 a year towards the carrying on, perfecting, and endowing of this hospital. The great officers of state and wealthy individuals also subscribed liberally to the undertaking. It was at the same time enacted by parliament, that a deduction of sixpence per man per month should be made out of the wages of all mariners for the use of the hospital; and power was given to the lord high admiral to appoint commissioners for receiving the said duty, whose office is situated on Tower Hill. These deductions no longer exist, and the establishment has been broken up. In 1699 his majesty contributed the sum of L.19,500, being fines laid by the House of Lords on certain merchants convicted of smuggling. In 1705 Queen Anne assigned to the use of the hospital the effects of Kid the pirate, amounting to upwards of L.6000. In 1707, Robert Osbaldiston, Esq. devised by will half of his estate, which was valued at L.20,000. In the same year Anthony Bowyer gave the reversion of a considerable estate for the use of the hospital. By several statutes, the forfeited and unclaimed shares of prize-money were given to the hospital, and various grants, from time to time, continued to be made by parliament. But the most substantial grant was that made by the Commons, of the rents and profits of the forfeited estates of the Earl of Derwentwater,

Personel. amounting at that time to about L.6000 a year, and at present to the gross rental of L.60,000, of which, after payment of all expenses for improvements, repairs, collections, and incumbrances, the annual receipt may be estimated at from L.30,000 to L.40,000.

Permanent revenues. At present the permanent revenues of the hospital consist of the following heads :

1. The duties arising from the North and South Foreland light-houses.
2. The rents and profits of the Derwentwater estates, including the lead mines.
3. Rents of the market of Greenwich, and of certain houses there and in London.
4. Interest of money invested in the public funds.
5. Forfeited and unclaimed shares of prize-money.
6. Fines for various offences.

It is evident that the funds of the establishment must vary considerably in times of war and peace ; being lowest in the latter period, when the demands are heaviest upon it, especially for a certain number of years after the close of a war.

The rental of the estates belonging to the hospital in the counties of Northumberland, Cumberland, and Durham, rose from L.23,000 in 1805, to L.43,000 in 1816. The present gross rental of these estates and the lead mines, as above stated, amounts to about L.60,000, the North and South Foreland lights to L.7000, and the interest of funded property to L.50,000 ; making, with other contingencies, an annual revenue of about L.150,000, the whole of which is expended on the household establishment, the clothing, maintenance, and allowances to pensioners and other attendants, with repairs, taxes, and contingencies.

Hospital establishment. The establishment of this noble institution consists of a governor, who is a flag-officer in the navy, lieutenant-governor, four captains, and eight lieutenants, all resident within the hospital ; a treasurer, auditor, paymaster of pensions, secretary, clerk of the check, two chaplains, two physicians, three surgeons, two dispensers, steward, clerk of the works, and several clerks. The number of in-pensioners is about 3000, and the number of nurses 180, all of whom must be the widows of seamen of the navy, and under the age of forty-five years at the time of admission.

Pensioned officers on Greenwich Hospital. Under the naval administration of Earl Grey, the following officers were added to the out-pensions of Greenwich Hospital, to be selected by the admiralty, according to their respective claims on the service :

	Per Year.
10 Captains at.....	L.80
15 Commanders at.....	60
50 Lieutenants at.....	50
in addition to their half-pay.	

Out-pensioned seamen. The out-pensions to seamen were first established in the year 1763, by act of 3d Geo. III. ch. 16, in consequence of which 1400 out-pensioners were appointed at L.7 per annum each, after undergoing an examination at the admiralty as to their claims.

At the close of the long revolutionary war, the applications became so numerous, and the claims of the seamen who had been wounded or worn out in the service so strongly grounded in humanity and justice, that it became necessary to adopt a scale of pensions, and to establish certain rules and regulations, by which seamen of his majesty's fleet and royal marines should be remunerated for wounds or hurts, debility, and length of service. The following are the regulations.

For Wounds, Hurts, or Debility.

Every seaman, landman, boy, or royal marine, wounded or hurt in his majesty's service, is entitled to a pension

Personel. proportioned to his wounds or hurts, of not less than sixpence a day, and not more than one shilling and sixpence a day. For sickness or debility, after seven years' service, and under special circumstances before that period, of not less than fivepence a day, nor more than tenpence, according as he may appear capable of assisting himself. Beyond fourteen, and less than twenty-one years' service, not less than eightpence, nor more than one shilling and threepence. And after twenty-one years' service, one shilling and sixpence a day. But the rates are altered from time to time.

All the above-mentioned pensions may be forfeited by misconduct, by desertion, and by sentence of a court-martial ; also by neglecting or omitting to attend at such port or place, and at such time, as shall, in time of war, or in prospect of a war, be appointed for the assembling of the pensioners, by the lords commissioners of the admiralty.

To the noble institution of Greenwich Hospital is appended an asylum for the maintenance and education of the children of officers and seamen of his majesty's naval service.

The Naval Asylum was originally instituted by the Naval Patriotic Fund and private subscriptions, and afterwards established at Greenwich, by warrant under the king's sign-manual, dated in January 1818, appointing the lords commissioners of the admiralty to be commissioners and governors, who, with twenty-four directors, were to superintend and manage the same. The object was, the maintenance and education of a certain number of orphans and other children of the non-commissioned officers, seamen, and marines of the royal navy. As it was manifest, however, that this establishment, so contiguous to the hospital of Greenwich, could be managed without inconvenience by the commissioners and directors of that hospital, under a more effective and economical system, his majesty was pleased, by his warrant of January 1821, to annul the former warrant, and to vest the superintendence and internal management of the said asylum in the commissioners and governors of Greenwich Hospital.

The two schools of Greenwich Hospital and the Naval Asylum, and the funds thereof, are now therefore incorporated. The internal management is confided to the board of directors, and one of the captains of the hospital is intrusted with the general superintendence. A chaplain, and proper schoolmasters, schoolmistresses, matron, and inferior assistants, male and female, with moderate salaries, reside in the building. The number of children maintained and educated in the institution are,

In the boys' upper school.....	200
... lower school.....	600
Girls.....	200

In the whole....1000

To the upper school no boys are admitted but the sons of seamen and marines, slain, drowned, or dead ; those of pensioners in the hospital ; of seamen disabled, past their labour, or otherwise objects of charity ; and of officers in the navy and marines, on the production of a required certificate of poverty. The age of admission is from eleven to twelve, and the continuance in the school three years, at the expiration of which they are bound apprentices to the merchant service. Presentations by the directors in rotation.

The boys and girls of the lower school are the children of seamen and marines of the naval service, admitted by the board of directors, giving a preference to orphans. The age of admission is from nine to twelve years inclusive ; but none is retained beyond the age of fourteen. The boys are sent into the navy, or merchant service, or put apprentices to some trade. The girls, at the age of fourteen, are apprenticed to trades, or sent to service.

Naxia
||
Nazareth.

Thus all the classes of officers, seamen, and marines, who have faithfully served in the navy, are provided for by the state; and the children of such as may be in indigent circumstances receive an education at the public expense, suited to their condition in life.

The total expense of the navy, including every branch

of the service, civil and military, for one whole year, about the middle of the last war, may be estimated at about L.18,000,000. In the year 1822, according to the estimates which were laid before parliament, it amounted to about L.5,000,000; and in the year 1837 it has been fixed at the sum of L.4,663,000. (M.)

NAXIA, the ancient Naxos, is one of the largest and most fertile of the islands in the Archipelago, known as the Cyclades. Its greatest length from north to south is seventeen miles, and its greatest breadth about twelve miles. The north point is in latitude 37. 12. Although the rocks are of a most repulsive appearance, yet the island is diversified by hills, valleys, and plains, and is well wooded and watered. Besides the city of the same name, it contains forty villages, and a population of about 12,000 persons. It produces corn equal to six months' consumption, and a surplus of oil, fruits, and cheese. Large quantities of oranges and lemons are exported. There is no port on the island for ships to enter.

NAXOS, or NAXIA, a considerable town, and capital of the Isle of Naxos, opposite the Isle of Paros, with a castle and two archbishops' sees, the one Greek and the other Latin. The greater part of the inhabitants are Greeks. Long. 25. 51. E. Lat. 37. 8. N.

NAYO, a small island in the Eastern Seas, near to the north coast of Celebes. Long. 124. 24. E. Lat. 1. 24. N.

NAYRES are the nobility of the Malabar coast. We may with truth affirm that they are the oldest nobility in the world; for the most ancient writers mention them, and quote the law which permits the Nayre ladies to have several husbands, every one being allowed four.

NAZARETH, a town or village of Palestine, celebrated in holy writ as the residence of our Saviour. It is situated in a deep valley, on the side of a high hill, nearer to its summit than its base, and having a rocky eminence along it. It contains about 250 buildings of stone, a material always at hand. They are flat-roofed, generally of only one story, but sufficiently spacious for the accommodation of the numerous poor families by whom they are inhabited. The streets are steep and narrow, and, from the looseness of the soil, exceedingly dirty. Of the public buildings the mosque is the most conspicuous, and is a neat edifice. It is enclosed with a good wall of masonry, so that Mr Buckingham, who visited it, could only see one of its sides, on which there were five arches. It has a plain whitened minaret, surrounded by a gallery, and surmounted by a crescent. The Greeks have a church on the south-eastern edge of the town, at the foot of a hill; and the Maronites have also a church in front of a Franciscan convent. This convent, Mr Buckingham mentions, is one of the largest and most commodious he had seen anywhere, being superior to those of Smyrna, Alexandria, or Cairo. It is still adorned with some precious remains of antiquity. Two antique shafts of red granite columns are used as portals to the door-way. Within is a court, and near the gate at its further extremity is the fragment of a shaft of another granite column, lying on the ground. White pillars form the portals of entrance to the original building, destroyed by the Turks; and of these the remains are still to be seen. On the wall, both within and without, there are worked into the masonry several pieces of the old ruins, containing delicate sculptures of frieze, cornices, capitals, &c. The gate leads to a large paved square, in which there are two wells, surmounted by the cross; and on the right hand is the hall for the reception of strangers and visitors. The interior is furnished with every convenience, in staircases, galleries, and apartments. Mr Buckingham mentions, that he supped in a hall below, of considerable

size. The table service consisted altogether of pewter, but every thing was extremely clean, and the provisions were excellent, particularly fine wheaten bread, and wine from Mount Lebanon, not inferior to the wines of France. The church belonging to the monastery is erected over a grotto, which is believed to have belonged to the Virgin Mary. In this place are shown her kitchen and fire-place; and by way of miracle a pillar is exhibited, the capital of which, separated from the shaft, is represented as self-supported in the air. Dr Clarke, however, soon observed that it was fastened into the wall above. Mr Buckingham was shown a second grotto, or a continuation of the first, with two red granite pillars, of about two feet in diameter at its entrance; and he was told that the one marked the spot where the Virgin rested, the other where the angel stood when he appeared to Mary. The church erected over this sacred spot is large, and well furnished with paintings, mostly gaudy, though there were a few not altogether devoid of merit. The synagogue in which Jesus read and expounded the prophet Esaias is shown here within the town; the precipice from which his enemies would have thrown him down is also pointed out; and, according to Mr Buckingham, it is not improbable that this precipice, which overlooks the town, was the scene of this outrage. But the most venerated relic is a stone called the table of Christ, from which he is asserted to have eaten before and after his resurrection. Nazareth forms part of the pachalik of Acre, and was reduced to indigence and misery by the oppression of Djezzar Pasha. Many of the wretched people emigrated in consequence; and several of the neighbouring Arabs said to Dr Clarke, that the beggars in England were better and happier than they. The stationary inhabitants are about 2000, of whom 500 are Catholic Christians, about 300 Maronites, and 200 Mahomedans, the rest being schismatic Greeks. Nazareth is fifty miles north from Jerusalem.

NAZARITE, or NAZAREAN, or *Nazarene*, a term which signifies one who is of Nazareth, or any native of the city of Nazareth. It was given to Jesus Christ and his disciples, and is commonly employed in a sense of derision and contempt by those authors who have written against Christianity. It has also been applied to a sect of heretics called Nazarenes; and sometimes it means a Nazarite, or one who has laid himself under the obligation of a vow to observe the rules of Nazariteship, whether it be for his whole life, as Samson and John the Baptist, or only for a time, as in the case of those mentioned in Numbers (vi. 18, 19, 20) and Amos (ii. 11, 12). Lastly, the name of Nazarite, in some passages of Scripture, denotes a man of particular distinction and great dignity in the court of some prince. Of these several sorts of Nazarites we shall now give some account.

The name of Nazarene belongs to Jesus Christ, not only because of his having lived the greater part of his life at Nazareth, and because this city has always been considered as his country, but also because the prophets had foretold that he should be called a Nazarene (Matth. ii. 23). "And he came and dwelt in a city called Nazareth, that it might be fulfilled which was spoken by the prophets, He shall be called a Nazarene." We find no particular passage in the prophets where it is said that the Messiah should be called a Nazarene; and St Matthew only quotes

Nazarite. the prophets in general. Perhaps he meant to insinuate, that the consecration of the Nazarites, and the great purity of which they made profession, were a type and a sort of prophecy of those of our Saviour, or else that the name *Nazir* or *Nazarite*, given to the patriarch Joseph (Gen. xlix. 26; Deut. xxxiii. 16), was a prophecy which was to be fulfilled in the person of Jesus Christ, of whom Joseph was a figure. Lastly, St Jerome was of opinion, that St Matthew here alludes to a passage in Isaiah, where it is said, "And there shall come forth a rod out of the stem of Jesse, and a branch (*Nezer*) shall grow out of his roots." According to the general consent of all the fathers and interpreters, this branch, or *Nezer*, and this root, are intended to denote Jesus Christ.

When the word Nazarene is applied to the heretics known by this name, it denotes Christians converted from Judaism, whose chief error consisted in defending the necessity or expediency of the works of the law, and who obstinately adhered to the practice of the Jewish ceremonies. The name of Nazarenes at first had nothing odious attached to it, and it was often applied to the first Christians. The fathers frequently mention the Gospel of the Nazarenes, as differing in nothing from that of St Matthew, which was either in Hebrew or Syriac, being for the use of the first converts, but afterwards corrupted by the Ebionites. These Nazarenes preserved the first gospel in its primitive purity. Some of them were still in being in the time of St Jerome, who does not reproach them with any error; they were very zealous observers of the law of Moses, and held the traditions of the Pharisees in supreme contempt.

Nazarite, when used to signify a person under the ancient law who had made a vow of observing a more than ordinary degree of purity, denotes a man or woman who engages himself or herself by a vow to abstain from wine and all intoxicating liquors, to let the hair grow without cutting or shaving, and not to enter into any house which was polluted by having a dead corpse in it, or to be present at any funeral. But if by chance any one should have died in the presence of such a person, he or she began again the whole ceremony of consecration and Nazariteship. This ceremony generally lasted eight days, sometimes a month, and sometimes their whole lives. When the time of their Nazariteship had been accomplished, the priest brought the person to the door of the temple, who there offered to the Lord a he-lamb for a burnt-offering, a she-lamb for an expiatory sacrifice, and a ram for a peace-offering. They likewise offered loaves and cakes, with wine necessary for the libations. After all this had been sacrificed and offered to the Lord, the priest or some one else shaved the head of the Nazarite at the door of the tabernacle, and burned his hair, throwing it upon the fire of the altar. Then the priest put into the hand of the Nazarite the shoulder of the ram roasted, with a loaf and a cake, which the Nazarite returned into the hands of the priest, who offered them to the Lord, lifting them up in the presence of the Nazarite; and from this time he might again drink wine, his Nazariteship being now accomplished. As to those who were perpetual Nazarites, like Samson and John the Baptist, it appears that they were consecrated to their Nazariteship by their parents, and continued all their lives in this state without drinking wine or cutting their hair.

Those who made a vow of Nazariteship out of Palestine, and could not come to the temple when their vow was expired, contented themselves with observing the abstinence required by the law, and afterwards cutting their hair in the place where they happened to reside. As to the offerings and sacrifices prescribed by Moses, which were to be offered by themselves, or by others for them at the temple, they deferred this till they found a conve-

nient opportunity. Hence it was that St Paul being at Corinth, and having made the vow of a Nazarite, he had his hair cut off at Cenchrea, and postponed fulfilling the remainder of his vow till he should arrive at Jerusalem (Acts, xviii. 18). When a person found that he was not in a condition to make a vow of Nazariteship, or had not leisure to perform the ceremonies which it rendered necessary, he contented himself by contributing to the expense of the sacrifice and offerings of those who had made and fulfilled the vow; and by this means he became a partaker in the merit of such Nazariteship. When St Paul went to Jerusalem, in the year of Christ 58, the apostle St James the Less, with the other brethren, said to him (Acts, xxi. 23, 24), that to quiet the minds of the converted Jews, who had been informed that he everywhere preached up the entire abolition of the law of Moses, he ought to join himself to four of the faithful who had made a vow of Nazariteship, and contribute to the charge of the ceremony at the shaving of their heads; by which the new converts might perceive that he continued to keep the law, and that what they had heard of him was not true.

The Hebrew word *Nazir*, which is employed to signify a person exalted to great dignity, as it is said of the patriarch Joseph (Gen. xlix. 26; and Deut. xxxiii. 16), "that he was separated from his brethren," as it is in our translation, or as the Vulgate and others understand the Hebrew, "that he was a Nazarite amongst his brethren," has been variously understood. Some think that the Hebrew word *Nazir*, in these places, signifies one who is crowned, chosen, separated, or distinguished; indeed the word *Nazir* signifies a crown. The Septuagint translate this word a *chief*, or him who is honoured. Calmet thinks that it was a term of dignity in the courts of eastern princes; and mentions, that at this day in the court of Persia the word *Nazir* signifies the superintendent-general of the king's household, the chief officer of the crown, the high steward of his family, treasures, and revenues; in which sense Joseph was the *Nazir* of the court of Pharaoh. Le Clerc translates the term *Nazir* a prince, and calls Joseph "the prince of his brethren;" and Pool declares in favour of this last translation.

NAZIM, a river of Asiatic Russia, in the government of Tobolsk and district of Berezof, which falls into the Obi, after a course of 160 miles.

NAZOOK, a large lake of Armenia, situated amongst the mountains, in a bare and desolate country, being thirteen miles in length and five in breadth.

NEALING, or rather ANNEALING, a term used to signify the preparing of several matters, by heating or baking them in the oven, or otherwise. See ANNEALING.

NEAMUTSERAI, a fortified village of Afghanistan, in the district of Puckoli, on the north-eastern border of Lahore. It has a caravanserai, which is placed in a break of the great range of mountains, which extends from the Punjab to the Indus. Long. 71. 50. E. Lat. 33. 30. N.

NEAP or NEEP TIDES are those tides which happen when the moon is in the middle of the second and fourth quarters. The neap tides are low tides in respect of their opposites the spring tides. As the highest of the spring tides is three days after the full or change, so the lowest of the neap tides is four days before the full or change; on which occasion the seamen say that it is deep neap.

NEAPED. When a ship wants water, so that she cannot get out of the harbour, off the ground, or out of the dock, the seamen say she is *neaped*, or *beneaped*.

NEARCHUS, the admiral of Alexander the Great, was the son of Androtinus, a native of Crete, and flourished 330 before Christ. He was the personal friend of Alexander before the death of his father, and was obliged to fly from Macedonia when Philip began to be suspicious of the intentions of his son. Nearchus attended Alexander

Nazim
||
Nearchus.

Nearchus. in his eastern expedition, and was left to watch over Lycia and the adjoining countries. (Arrian, iii. 6, 8; Irid. 18, 4, 10.) After the conquest of Darius, he was called from his province by Alexander, and appointed to command the fleet which was hastily constructed on the river Hydaspes,¹ from the timber which grew upon its banks. Onesicritus was appointed second in command. Both admirals afterwards left a detailed account of their voyage from the mouth of the Indus, where they parted with Alexander, proceeding along the coast towards the Persian Gulf, and as far as the river Euphrates. The journal of Nearchus has luckily been preserved for us by Arrian in his Indian history (cap. 20), and it corresponds in general so closely with the descriptions of modern navigators, that there can be no doubt of its authenticity. Strabo (ii. 70) indeed expresses doubts respecting the correctness of his statements; and perhaps there may have been some exaggeration of the dangers he encountered, and the wonders he saw, but he has certainly given a very accurate account of the coast along which he sailed.

This was the first time that a Greek fleet had entered the Indian Ocean; and when Alexander made known his intentions, the sailors murmured at the unknown dangers to which they were going to be exposed. The appointment, however, of his beloved friend Nearchus to command the exploring expedition quieted their apprehensions, as they were satisfied that the dangers could not be so great as they imagined, when Alexander was willing to allow Nearchus to be exposed to them. Alexander left the fleet at a spot called Xylenopolis, in the month of August 326 before Christ, and proceeded with his army across the sandy deserts of Mekran to Persia. About the month of October, when the south-west monsoon had ceased to blow, Nearchus sailed down the western branch of the Indus, now called Buggaur, into the Indian Ocean, which he reached after a passage of 150 stadia. He directed his course to the north-west, and, after sailing 150 stadia, reached a small sandy island called Crocala, now Chulna, or Chilni, which is situated off Cape Mouze, about five miles from the mainland. It is now described as a small desolate rock, about two miles in circumference, rising abruptly from the sea in a conical shape, to the height of about two hundred feet. Proceeding from Crocala, and having a mountain, which he calls Eiros, on his right, and a low sandy island on his left, he entered a large and safe harbour, which he designated Port Alexander. This is now called Sonmeany, and is said to be a creek running up some distance inland. Here he found that the south-west monsoon was still blowing with much fury, and he therefore remained quietly for twenty-three days. During his voyage for the next three hundred miles, he landed at many spots along the coast; and at the mouth of the Tomerus, or Tuburus, now called Busul, he had an engagement with the inhabitants, who assembled to the number of six hundred. He describes their bodies as in the most filthy state; their nails being so long and hard that they made use of them instead of iron, with which they were unacquainted. The people along this coast he calls Oreitæ, or Oræ, and states, that they had the same dress and arms as the Indians, but that their language and manners differed. A passage of 300 stadia then brought him to Malana, said to be still called Malin, which was the last spot belonging to the Oreitæ.

The whole of the remainder of the coast, to the vicinity of the entrance to the Persian Gulf, was inhabited by the Ichthyophagi or fish-eaters, a name which the Greeks gave to them on account of their mode of life. The country, to a considerable distance inland, was little else than a sandy desert, and the inhabitants supported themselves chiefly on

the fish which they caught. From Malana Nearchus sailed 600 stadia to Bagisara, which he represents as a harbour fit for the reception of a fleet. It is now known under the name of Arabah or Hormarah Bay. The high rugged promontory which he passed immediately after leaving this place is now Cape Arabah. At the small island of Carinê, now Ashtola, he was hospitably received by the inhabitants, who supplied him with some sheep; but they found that even these animals tasted of fish, as well as the sea-birds which they caught. This island is represented as about four or five miles in circumference, and situated twelve miles from the coast of Mekran; but not a vestige of any habitation now remains. Proceeding 350 stadia, he reached an excellent harbour, which he calls Mosarna, where there were fishermen, and plenty of water, from the want of which they had suffered since they left the river Indus. This harbour was formed by a promontory projecting 150 stadia into the sea, now called Ras No, and the bay is that of Gwadel. Nearchus states, that he considered his dangers as now ended, and that the coast began to assume a much less desolate appearance. In 1150 stadia, he reached a small village, Barna, where there were palm trees, gardens with myrtles and flowers, and the inhabitants seemed to have some degree of cultivation. He began, however, to suffer from want of provisions; and having reached a small city, the only one he mentions in his voyage along this coast, he determined to compel the inhabitants to supply him with whatever they had. It is curious that the name of the city should not be mentioned; but having obtained possession of it by stratagem, he found that they had little else than flour made of the bones of fish ground to powder. He at length reached the end of the coast of the Ichthyophagi, which he describes as being 10,000 stadia in length. He now found himself on the coast of the fertile province of Carmania, and at Badis, now Jask, he obtained abundance of water and corn. On reaching Harmozia, at the mouth of the river Anamis, now called Minab, he discovered that Alexander was at no great distance with his army; and having landed, he proceeded to the camp, where he was received with great joy by the king and the whole army. He was directed to conduct the fleet up the Persian Gulf, to the mouth of the Euphrates, and reached the city Diridotis in safety. (See Notes on the Eastern Shores of the Persian Gulf in 1828, by Kempthorne, in the *Geographical Journal*, vol. v. p. 263; also the *Voyage of Nearchus*, illustrated by Dr Vincent, London, 1797; and *Recherches sur la Géographie des Anciens*, par Gosselin, vol. iii.)

NEAS, or NIAS ISLE. This island is situated on the west coast of Sumatra, from which it is separated by a strait sixty miles in breadth, and is fifty miles in length by twenty in average breadth. It is a large and productive island, and is divided into about fifty small districts, under chiefs or rajahs, who live in a state of perpetual hostility, their great object being to make prisoners, that they may sell them for slaves. These violences are encouraged by native traders, who resort to these islands for cargoes of slaves, and who are accused of occasionally surprising and carrying off whole families. The number of slaves exported is estimated at from 600 to 1000. Besides slaves, padi and rice are exported to a considerable amount. The cultivation of these articles is carried on at a distance from the coast, whither the natives retire, to be secure from piratical depredations. They bring down their produce to the harbours, and exchange it for iron, steel, beads, tobacco, and the coarser kinds of Madras and Surat piece-goods. Hogs are reared in great numbers; and several parts of the continent are supplied from thence with yams,

¹ Now the Behut or Bedusta, also called by the natives the Jylum, which still affords an abundant supply of timber.

Neath
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Necessity.

bears, and poultry. It is well peopled, and its inhabitants are a peculiar and distinct race, not only from those of Sumatra, but from the people on all the islands to the southward. They are of lighter complexions, especially the women, than the Malays; smaller also in their persons, and shorter in their stature, with broad mouths, flat noses, and their ears pierced and distended in an extraordinary manner. They have a singular sort of leprous scurf on their skins, which in some covers the whole body and limbs, whilst in others it resembles rather the ring-worm running in waving lines or concentric curves. The principal food of the common people is rice, and the better classes use pork. The natives are remarkable for their docility and expertness in handicraft work, and are excellent house-carpenters and joiners. They are likewise industrious and frugal, temperate and regular in their habits, but at the same time avaricious, sullen, vindictive, and sanguinary. They are often employed by the Dutch as domestic servants; but they are always esteemed dangerous. In many cases, however, this may be owing to the bad treatment which they receive. Some of the petty rajahs in the island have amassed treasures to a considerable amount, equal to 10,000 or 20,000 dollars.

NEATH, a market-town of the hundred of the same name, in the county of Glamorgan, in South Wales, and distant 197 miles from London. The neighbourhood abounds in good coal, which is brought by canals from the pits to the navigable river Neath, and which forms an important branch of its commerce. There are, besides, several extensive works for smelting the copper ore produced on the opposite shore of Cornwall. About half a mile west of the town are the remains of its extensive and picturesque castle, and beyond it the cascade of Mellincourt, where the river Clydaugh precipitates itself over rocks of eighty feet perpendicular height. It is a corporate town, being governed by a portreeve, four aldermen, and eleven councillors. In addition to the parish church, there are places of worship for various bodies of dissenters. It has a well-supplied market on Wednesday. The population amounted in 1821 to 2823, and in 1831 to 4043.

NEBULY, or NEBULEE, in *Heraldry*, is when a coat is charged with several little figures, in form of words running within one another, or when the outline of a bordure, ordinary, or the like, is indented or waved.

NECESSITY, whatever is done by a cause or power that is irresistible. In this sense it is opposed to freedom. Man is a necessary agent, if all his actions be so determined by the causes preceding each action, that not one past action could possibly not have come to pass, or have been otherwise than it has been; or if it be so ordained that any future action cannot possibly not come to pass, or be otherwise than it shall be. But he is a free agent if he be able, at any time, to do different things; or, in other words, if he be not unavoidably determined in every point of time, by the circumstances in which he is placed, and the causes to the action of which he is exposed, to do that one thing which he does, and not possibly to do any other thing. Whether man is a necessary or a free agent, is a question which has been debated with much ingenuity by writers of the first eminence. (See *METAPHYSICS*, part iii. chap. v.; and also *PREDESTINATION*.)

NECESSITY, in *Mythology*, a power superior to all other powers, and equally incapable of being resisted by gods or men. Herodotus, as quoted by Cudworth, mentions an oracle which declared that "God himself could not shun his destined fate;" and amongst the fragments of Philemon, collected by Le Clerc, we find the following sentence:

Δούλοισι βασιλεῶν ἴσμεν, οἱ βασιλεὺς θεῶν, ὁ θεὸς ἀναγκῆς.

"We are subject to kings, kings are subject to the gods,

and God is subject to Necessity." Hence it is that, in the *Iliad*, we find Jove himself, the sire of gods and men, regretting that he was restrained by Necessity from rescuing his favourite son from the sword of Patroclus. Nay, to such a height was this impiety carried in the earliest ages of Greece, that we find Hesiod and Homer teaching that the gods themselves were generated by Necessity engendering with Night and Chaos.

This power, although always represented as blind and unintelligent, was, however, worshipped as a goddess, bearing in her hand large iron nails, and wedges, and anchors, and melted lead, as emblems of the inflexible severity of her nature. In the city of Corinth she had a temple, in which the goddess of Violence likewise resided, and into which no person was ever permitted to enter except the priest who officiated in *sacris*.

Learned men have exercised their ingenuity in vain attempts to trace this portentous notion to its origin. Some, who wished to interpret it in a pious sense, have supposed that the gods who are subject to necessity were only those who were the ministers of the supreme *numen*; and that by necessity itself nothing more was meant than divine providence. But this is not consistent with the generation of the gods according to Homer and Hesiod, nor with the epithets *sæva necessitas*, *dura necessitas*, by which this power was perpetually distinguished. Others, amongst whom may be mentioned Mosheim, have supposed that this monstrous fable was invented by the Pagan priests, and diligently inculcated upon the minds of the people, to excuse the villanies of the objects of their worship.

NECHO, a king of Egypt, who began his reign 690 before Christ, and was killed eight years afterwards by Sabacon king of Ethiopia. Psammeticus his son succeeded him, and was the father, as Herodotus informs us, of Necho II. who reigned about 616 before Christ. This Necho II. is celebrated in history for attempting, though in vain, to cut a canal from the Nile to the Arabian Gulf. He carried his arms as far as the Euphrates, and conquered the city of Carchemish. This prince is not only known in Scripture, but also in profane history, under the name of Necho. He had no sooner succeeded to the crown than he raised great armies, and fitted out vast fleets, as well upon the Mediterranean as upon the Red Sea; he gave battle to the Syrians near the city of Migdol, and having routed them, made himself master of the city of Cadytis. The learned, however, are not agreed respecting this city of Cadytis. Some conceive it to have been Cades in Arabia Petræa, others Jerusalem, and others the city of Cedes, or Kedesh, in Galilee, in the tribe of Naphtali.

The Scriptures inform us of the expedition of Necho in all its particulars (2 Kings, xxiii. 29, &c.; and 2 Chronicles, xxxv. 20, 21, &c.). In the year of the world 3394, this prince having drawn out his army into the field in order to make war with the Assyrians or Babylonians, and to take the city of Carchemish, otherwise called *Circusium*, upon the Euphrates, Josiah king of Judah, who was a tributary to the king of Babylon, marched to oppose his passage. Necho, who had no designs against Josiah, sent to remonstrate with him. "What have I to do with you, king of Judah? It is not against you that I am come forth, but against another people, against whom the Lord has commanded me to make war. Leave off, therefore, to set yourself against me, for fear the Lord should punish you for your resistance." But Josiah would not hearken to the remonstrances of Necho, and gave him battle at Megiddo, where he received the wound of which he died. The people of Jerusalem set up Jehoahaz as king of Judah, and Necho soon advanced, without making any longer stay in Judæa.

But at his return from his expedition, which proved very successful, he halted at Riblah in Syria; and send-

Necho.

Necker.

ing for Jehoahaz the king of the Jews, he there deposed him, loaded him with chains, and carried him into Egypt. Then marching to Jerusalem, he set up Eliakim, or Jehoiakim, in his stead, and exacted the payment of an hundred talents of silver and one talent of gold from the country. Jeremiah (xli. 2) informs us that the city of Carchemish was taken from Necho, by Nebuchadnezzar king of Babylon, in the fourth year of Jehoiakim king of Judah; and Josephus adds, that the king of Babylon, pursuing his victory, brought under his dominion all the country which is situated between the Euphrates and Egypt, excepting Judæa. Thus Necho was again reduced within the limits of his own country.

NECKER, JAMES, a well-known statesman and financier of France. He was born on the 30th of September 1732, at Geneva, being descended of a respectable family, originally from the north of Germany. At the age of fifteen he quitted Geneva, and proceeded to Paris with a view to push his fortune in that city. He entered first into the banking-house of Vernet, and afterwards into that of Thelluson, of which he became the cashier, and at length a partner. On the death of Thelluson, he established a bank on his own account, by which he accumulated a very large fortune. After twenty years of unremitting attention to business, he married a Protestant lady of respectable family, but in reduced circumstances, the patrimonial estate having been lost in consequence of the revocation of the edict of Nantes. With this lady he appears to have enjoyed the highest degree of domestic happiness. A short time after his marriage, he was named minister of the republic of Geneva at Paris. In accepting of this employment he refused the emoluments which were attached to it, a degree of forbearance not very usual in public men, but in which he resolutely persisted during the whole course of his political life. Two works which he published, namely, an Eulogium on Colbert, and a treatise on the Legislation and Trade of Corn, greatly extended the reputation of his political talents; and he had fortunately succeeded in adjusting some differences between the East India Company and the crown, in such a manner as to receive the approbation of both parties, a circumstance which added to the weight of his character.

About this time the disorder in the state of the French finances had become so alarming, that it was found necessary to break through the routine of official promotion, and to choose able men for the public service wherever they could be found. These inducements so far outweighed the objections to M. Necker, as a foreigner and a Protestant, that, after some conversations with M. Maurepas, he was, in the year 1776, appointed director of the royal treasury, and, in the following year, director-general of the finances. The great object of M. Necker was to introduce order and economy in the public management. With this view he found himself compelled either to suppress useless offices, or to diminish emoluments; and his retrenchments drew upon him the enmity of all those who suffered by his economical reforms. A party was formed against him, chiefly composed of rapacious courtiers; and though the repeal of several most oppressive imposts had conciliated the general good will of the people, he was daily the object of malicious libels. His severe measures of economy had also excited the dislike of the minister M. Maurepas, although others ascribe his hostility to a different cause, namely, to his disappointment at not finding in Necker that subserviency which he expected from a person of his comparatively obscure origin, and a Protestant. Whatever was the reason, the minister was amongst the number of his enemies; and he is charged by Madame de Staël with secretly instigating those libellous attacks of which M. Necker now became the object. To enable him, according to Madame de Staël, the better to struggle with

Necker.

his opponents, he requested some signal mark of royal favour, such as a seat in the council, which was granted. This demand on the part of Necker gave rise to new and acrimonious discussions, in the course of which he tendered his resignation, after having been five years in office. Others give a different account of this transaction. Under the influence, it is said, of that passion for popular applause, which proved the torment of his life, he published, in 1781, the well-known piece on the state of the finances, entitled *Le Compte Rendu au Roi*, of which an immense number of copies were sold. Elated by this success, he made a demand for a seat in the council, but was objected to on the ground of his religion. Being persuaded that this scruple would be abandoned, he persisted, and offered his resignation, which was accepted; and in this manner, as is alleged, he became the dupe of his own presumption.

The enemies of Necker reproached him with indulging, during his short administration, his passion for popularity at the expense of the public interest. The great point which he laboured to establish in his *Compte Rendu* was, that there was no deficit in the public revenue, and that there was no necessity for additional taxes. In lieu of new impositions, he is charged with supplying the public necessities by the expedient of large loans; postponing, in this manner, the evil day, but accumulating on posterity an increasing load of debt, which, sooner or later, must be provided for by adequate taxes, and all this to procure a temporary popularity at the expense of his rivals. Notwithstanding these objections, he had numerous partisans, especially amongst the men of letters, who regarded his elevation to power as the triumph of philosophy and liberal principles over aristocratical prejudice.

After his resignation, he retired to Switzerland, where he purchased the barony of Coppet. In 1784 he published an able work, further illustrating his financial policy, entitled *De l'Administration des Finances*. This work, of which 80,000 copies were speedily sold, served to support the reputation of his plans, and also to keep together his adherents, whose numbers formed a counterpoise to the influence of his enemies at court.

In 1787 M. de Calonne convoked the Assembly of the Notables, and, in his opening speech to that body, impeached the accuracy of the statements contained in the *Compte Rendu*. It was not to be supposed that M. Necker would quietly submit to this charge. He sent a memorial upon the subject to the king, with various other papers, for the purpose of proving the correctness of his calculations. His majesty having read these documents, requested that they might not be published, a proposition which by no means suited the views of M. Necker. His statements were accordingly printed, and for this offence he was exiled, by a *lettre de cachet*, forty leagues from Paris.

M. de Calonne did not, however, remain long in power; and the Archbishop of Toulouse, by whom he was succeeded, was also obliged to resign, and to make way for M. Necker, the favourite of the people, who was reinstated in his former post in August 1788. A new and remarkable era was now about to open in the history both of France and of the world. The writings of the French philosophers and men of letters had gradually given currency to notions of constitutional freedom. The people could no longer endure, like their forefathers, the bondage of feudal privileges, by which the few acquired the power of oppressing the many. They had become jealous and discontented, and were deeply irritated at the insolence and oppression of the aristocratical body; and with those indignant feelings were mingled, in the minds of the popular leaders, the brilliant visions of speculative reform. But as long as the people wanted a legitimate organ through which their voice could be heard, it was clear that what-

Necker. ever might be their feelings, they could make little impression on the measures of the state. What was wanting in this respect was now about to be supplied; and the popular voice, hitherto so little considered, was, through the representative body, to become the pre-eminent influence in the government. At this period the French government was assailed by a complication of difficulties, the chief of which was the impracticability of raising the necessary supplies, and the danger of an immediate bankruptcy. A great scarcity also prevailed at Paris, which rendered the populace unusually discontented and tumultuous. In this emergency various expedients were suggested; and the convocation of the states-general, which had long been talked of, was advised by M. Necker, as likely to give general satisfaction to the people. In assenting to this proposition, it was the plan of the court that the different orders of the clergy, nobility, and commons, should vote in separate chambers, in order that the deputies of the commons might be controlled by the other two bodies. But the popular leaders were by far too penetrating to allow their influence to be annihilated by this device. They determined, from the beginning, that the three orders should sit and vote together; and it is well known that, after various fruitless efforts to bring about this union, the commons resolved to form themselves into an assembly for the despatch of business, without regard to the other two chambers. This decisive step proved effectual, and the three chambers at length all met and voted in one house, by which the whole power was thrown into the hands of the commons.

During these transactions, the king and his advisers pursued a weak and vacillating policy. They perceived, when it was too late, the error they had committed, or supposed themselves to have committed, in putting into the hands of the people the powerful weapon of a representative body. But instead of yielding to the necessity of circumstances, and conciliating this new power, which could no longer be resisted, by conceding with a good grace every just demand of constitutional right, they endeavoured to recover the ground which they had for ever lost, vainly struggling against the power of the commons, and meditating even the most violent measures for the recovery of their authority. It was in pursuance of these views that troops were drawn from the most distant parts, and encamped around Paris; a measure, the only construction that could be put upon which was, that it was intended to overawe the deliberations of the assembly, or, perhaps, to dissolve it at once at the point of the bayonet. These violent courses M. Necker opposed, and he was accordingly dismissed on the 11th of July 1789, and ordered to quit the kingdom in twenty-four hours. This order he obeyed with equal secrecy and despatch, and had arrived at Brussels before it was generally known in Paris that he was out of office.

It is impossible to describe the consternation which prevailed in the capital when the dismissal and exile of this favourite minister was made known. The person who first communicated the intelligence was considered as a madman, and with difficulty escaped some harsh treatment; and the event was no sooner confirmed, than all the shops and places of amusement were shut up, and his bust, along with that of the Duke of Orleans, was paraded through the streets, dressed in mourning. These proceedings were interrupted by a German regiment; the busts were broken in pieces; and in the course of the tumult one man lost his life, whilst others were wounded. Fresh troops arriving, a serious conflict now ensued; and an old man being cut down in the Tuilleries by an officer of distinction, the populace were enraged to the highest pitch, and being joined by the French guards, who deserted their officers, they at last succeeded in overpowering

the Germans. New outrages and tumults succeeded; the Bastille was stormed; and the capital became the scene of bloody massacres, whilst the people's minds were at the same time filled with dismay at the near approach of foreign troops, from whom they apprehended nothing less than the sack of the city. In the midst of these alarms, they beseeched the assembly to intercede with the king for the recall of their favourite minister. The necessity of complying with this demand was at length perceived by the king, and a letter was written to M. Necker, requesting him to return.

M. Necker was at Basle when he received this letter, with the request contained in which he resolved immediately to comply. His progress to Paris was one continued triumph. He was cheered as he passed through the different towns by the acclamations of multitudes, who hailed him as their deliverer. This popularity, however, was not of long duration. Being alarmed by the excesses which had already taken place, M. Necker became desirous to support the authority of the sovereign; and, without conciliating the confidence of the king's friends, he lost that of the popular party. By the royalists he was always hated; he now became an object of suspicion to the more violent patriots, and was reproached as an aristocrat. Seeing his popularity on the decline, he resolved to retire; and he accordingly wrote a letter to the assembly, pleading the necessity of repose for the restoration of his health. No notice was taken of this letter; and his personal safety being now in danger from the violence of the people, he quitted Paris in the month of December 1790, having withdrawn in the most private manner possible.

After the loss of his power and popularity, M. Necker seems to have sunk into the greatest dejection. "I could have wished," says Mr Gibbon, who passed some days with him about this period, "to have exhibited him as a warning to any aspiring youth possessed with the demon of ambition. With all the means of private happiness in his power, he is the most miserable of human beings; the past, the present, and the future, are equally odious to him. When I suggested some domestic amusements, he answered with a deep tone of despair, 'In the state in which I am, I can feel nothing but the blast which has overthrown me.'"

But his mind was soon diverted from the disappointments of ambition by domestic griefs of a more poignant nature; his wife, to whom he was deeply attached, dying after a long illness, in which he attended her with great affection. He had now recourse to writing to divert his melancholy; and several works, which he published, were the fruits of his labours. He died at Coppet, on the 9th of April 1804, after a short but painful illness. His public character is, of course, differently estimated, according to the political views of parties. In his private and domestic relations he was amiable and affectionate, and appears to have been greatly beloved.

His writings, besides those already mentioned, are the following: An Answer to the Memorial of the Abbé Morellet, on the East India Company, 1769; Memorials on the Provincial Administrations, 1781; Answer to the Speech pronounced by M. de Calonne to the Assembly of Notables, 1787; New Explanations on the Compte Rendu, 1788; Of the Importance of Religious Opinions, 1788; Observations on the Introduction to the Red Book, 1790; On the Administration of M. Necker, by Himself, 1791; On the Executive Power in Great States, 1791; On the French Revolution, 1796; Course of Religious Morality, 1800; Last Views of Politics and Finance. (See *Dictionnaire Universelle*, article NECKER; *Biographie Universelle*, article NECKER; *Mémoires sur la Vie Privée de mon Père*, par Madame la Baronne de Staël-Holstein, suivis des *Mélanges de M. Necker*.)

Necker.

Necker
Isles
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Necro-
mancy.

NECKER ISLES, a group of small islands in the South Pacific Ocean, nine in number. They were discovered and so denominated by Prowse. The principal island is about 500 toises in length, and sixty in elevation. Long. 162. 32. W. Lat. 23. 31. N.

NECROLIUM, a word used by some of the alchemist writers to express a remedy almost always capable of averting death, and continuing life to its utmost period.

NECROLOGY (*necrologium*, formed of νεκρος, *dead*, and λογος, *discourse*), a book anciently kept in churches and monasteries, in which were registered the benefactors of the same, the time of their deaths, and the days of their commemoration; as also the deaths of the priors, abbots, religious, canons, and other persons. This was likewise called *calendar* and *obituary*.

NECROMANCY, the art of revealing or foretelling future events by a pretended communication with the dead.

This most superstitious and impious imposture appears to have had its origin at an early period in Egypt, and to have been thence propagated in every nation with the manners of which history has made us acquainted. The conquests of Sesostrius might introduce it into India; the Israelites would naturally borrow it from the people amongst whom they sojourned four hundred years; and it would easily find its way into Phœnicia, from the vicinity of that country to the land of its nativity. From the Egyptians and Phœnicians it was adopted, with the other rites of paganism, by the Greeks; and with Grecian literature and Grecian manners it was imported into Rome. It was not, however, confined to the pagan nations of antiquity. It spread itself throughout all the modern nations of Europe, and took such deep root as to be long retained even after those nations had been converted to the Christian faith.

Of its early antiquity we have complete evidence in the writings of Moses, where it is severely condemned as an abomination to the Lord; and although it appears to have even then spread into Phœnicia, we might yet conclude that its birthplace had been Egypt, because, at their exodus, the Israelites were corrupted only by Egyptian superstitions, and because necromancy seems to have been one of those whoredoms which the prophet Ezekiel represents his countrymen as having brought with them from Egypt, and continued to practise until they were carried as captives into Babylon.

If from sacred we proceed to consult profane authors, we shall find them not only affirming that Egypt had been the birthplace of necromancy, but in some degree accounting for the origin of so impious a delusion. From Diodorus we learn that the Grecian fable of Charon the ferryman of hell, of Styx, Cocytus, the Elysian Fields, Tartarus, the judgment of Minos and Rhadamanthus, &c. with the whole scenery of the infernal regions, were imported from Egypt into Greece. The ancient Egyptians, and indeed all the people of the East, made use of caves as burying-places; which were well suited to the solemn sadness of surviving friends, and proper receptacles for those who were never more to behold the light. In Egypt, many of these subterranean cavities being dug out of the natural rock, still remain, and command the admiration of travellers; and near to the pyramids in particular there are

some apartments of a wonderful fabric, which, though they extend in length upwards of four thousand feet, and are about thirty feet in depth, appear to have been, if not entirely dug, at least reduced to form, by the chisel or the pick-axe of the artist.

From the practice of burying in such caverns sprung the opinion that the infernal mansions were situated somewhere near the centre of the earth, which by the Egyptians was believed to be not very distant from its surface. In these dreary abodes, it was easy for such adepts as the priests of Egypt to fabricate Erebus, and Tartarus, and the Elysian Fields, and all those scenes which were displayed before the initiated (see MYSTERIES), and by them described to the millions of the people. As it was in those dark abodes that necromancy was practised, it would be no difficult matter for such magicians as withstood Moses, to impose so far upon the credulous vulgar as to make them believe, that in consequence of their invocations they actually saw the ghosts of their friends ascend out of the earth. It appears from the book of Exodus, that the Israelitish women were, even in the wilderness, well acquainted with the use of the mirror, which was therefore undoubtedly known to the Egyptians. But a mirror of a particular form, and properly illuminated at the instant required, might be easily made to reflect, in a cavern from which all other light was carefully excluded, the image of the deceased, when called upon by the necromancer; and we can also readily conceive, that with respect to the question to be proposed, a person might be concealed, prepared to give such ambiguous answers as would satisfy the inquirer, and at the same time to save the credit of the oracle. The terrified imaginations of the spectators would aid the delusion, and make a very slight resemblance pass for the ghost or εἰδωλον of their departed friend; or the necromancer might assign plausible reasons why a spectre, after having dwelt for some time in the infernal regions, should lose something of its resemblance to the body which it animated. Such juggling tricks, though performed by artists less accomplished than Jannes and Jambres, have gained credit amongst people much more enlightened than the Egyptians can possibly have been when the science of necromancy was invented by their priests.

That the Israelites, notwithstanding the prohibition of their legislator, continued to practise the rites of necromancy, is apparent from Saul's transaction with the witch of Endor. From the same transaction, it is likewise apparent that the witches of Israel, and therefore in all probability the necromancers of Egypt, pretended to evoke the ghosts of the dead by a demon or familiar spirit, which they had at their command to employ upon every emergency. This demon was called *ob*; and therefore Saul desires his servants to find him a woman who was mistress of an *ob*.¹ It is probable that those wretched impostors had in their pay some persons who occasionally acted the part of the demon, and, when the execution of the plot required their agency, emitted, by means of a cavity dug for that purpose, a low hollow voice from below the ground. Hence we find Isaiah, in his denunciations against Ariel, saying, "Thou shalt be brought down, and shalt speak out of the ground; and thy speech shall be low out of the dust, and thy voice shall be as one that hath a familiar spirit

Necro-
mancy.

¹ The original or radical signification of this word occurs in Job (xxxii. ver. 19), where Elihu compares his belly to new bottles, which he calls *oboth*, the plural of *ob*. But as bottles were then made of leather, new bottles filled with wine and ready to burst, as Elihu describes them, would of course be of a form nearly globular. Hence it may be inferred that the original import of *ob* was round or globular; but *b* and *p* being labials, are often changed into each other; and, therefore, from the Hebrew *ob* is derived the Greek ὀψ, *oculus*, ὀπτομαι, *video*, and the Latin *ops*, a name under which the earth was worshipped. *Upis* was a name of Diana or the moon: the father of one of the Dianas was likewise *Upis*; but this *Upis* was undoubtedly the sun. Now the difference between *upis* and *opis* is nothing; and hence we are led to believe, that as they are all derived from *ob*, this word was employed by the early idolaters of Egypt to denote the first and greatest of Pagan gods, the Sun. If so, those wretches who pretended to be mistresses of *obs* were exactly the same kind of impostors with the Pythonesses of the Greeks.

Necromancy. (an OB), out of the ground, and thy speech shall whisper out of the dust."

But although the Egyptian priests were undoubtedly the inventors of the whole mystery of necromancy, and although it was from them imported into Greece by the Selli or priests of Dodona, it does not appear that the Grecian necromancers pretended to be masters of OBs or familiar spirits. Mopsus, Orpheus, Linus, Eumolpus, and others, who either travelled into Egypt in quest of knowledge, or were actually natives of that country, instructed the early Greeks in this occult science; but whatever might be the practice of these apostles themselves, their disciples professed to do all the feats of magic by performing certain rites, by offering certain sacrifices, by muttering a certain form of words, and by charms, spells, and exorcisms. By these they pretended to evoke the dead as certainly as the Egyptians and Jews did by their familiar spirits. By a small display of critical learning this might easily be proved from the popular story of Orpheus and Eurydice, which certainly was founded on one of these necromantic deceptions exhibited in a cave near Dodona, where the priests had a *hades* or infernal mansion, in humble imitation of those with which the first of them were well acquainted in Egypt. It is indeed evident, without the aid of criticism; no man of any letters can be ignorant, that whatever superstitions of this kind prevailed amongst the Romans were borrowed from the Greeks. But we all know that Virgil makes one of his shepherds, by means of certain herbs, poisons, and senseless charms, raise up ghosts from the bottoms of their graves; and Lucian has fabricated a story of this kind, which may be considered as an exact parallel to that of the witch of Endor. Just before the battle of Pharsalia he makes young Pompey travel by night to a Thessalian sorceress, and anxiously inquire of her the issue of the war. This female necromancer, by a tedious process of charms and incantations, conjures up the ghost of a soldier who had been recently slain. The phantom, after a long preamble, denounces a prediction much of the same kind with that which the king of Israel received from Samuel at Endor; and though we have elsewhere shown, that nothing but the spirit of God could have foreseen the inevitable destruction of Saul, his sons, and his army, it was very easy for any man of tolerable sagacity to foresee the defeat of Pompey's raw and undisciplined troops by the hardy veterans of the victorious Cæsar.

It would be endless to enumerate all the fallacious evocations of ghosts, and the ambiguous responses returned by those pretended spirits, of which we have received accounts from the poets and historians of the celebrated nations of antiquity. We shall therefore proceed to mention a few which occur in the fabulous history of more modern nations, and then leave the subject to the meditation of our readers. In Mallet's Northern Antiquities we have the following account of a necromantic exploit, between which and the descent of the ancient heroes into hell it is impossible not to remark a striking similitude.

Odin, the sovereign of man, arises. He saddles his horse Sleipner; he mounts, and is conveyed to the subterranean abode of *Hela*. The dog which guards the gates of death meets him. His breast and his jaws are stained with blood. He opens his voracious mouth to bite, and barks a long time at the father of magic. Odin pursues his way; and the infernal cavern resounds and trembles under his horse's hoofs. At length he reaches the deep abode of death, and stops near the eastern gate, where stands the tomb of the prophetess. He sings with a voice adapted to call up the dead; he looks towards the world; he engraves Runic characters upon her tomb; he utters mysterious words; and he demands an answer, until the prophetess is constrained to arise and utter the words of the dead. "Who is this unknown that dares to disturb

VOL. XVI.

my repose, and drag me from the grave, in which I have been dead so long, all covered with snow, and moistened with the rain?"

Necropolis
||
Nectarium.

The Gaelic druids pretended to be masters of the same secret. This is evident from the name of a species of divination called *taghairm*, not uncommon amongst the Scotch Highlanders so recently as in the beginning of the eighteenth century. This word seems to be compounded of *ta*, which in some parts of the Highlands is still used to denote a spirit or ghost, and *ghairm*, which signifies calling upon or invoking. *Taghairm*, therefore, in its original import, is necromancy in the most proper sense of that word.

There were different kinds of *taghairm*, of which one was practised in Skye. The diviner covered himself with a cow's hide, and repaired at night to some deep-sounding cave, whither the person who consulted him followed soon afterwards without any attendants. At the mouth of the cave he proposed aloud the questions of which he wanted solutions; and the man within pronounced the responses in a tone of voice similar to that with which the OBs, or pretended demons of antiquity, gave from beneath the ground their oracular answers. That in the latter days of *taghairm*, the Gaelic diviners pretend to evoke ghosts, and from them to extort solutions of difficulties proposed, we have no positive evidence; but that such was the original pretence there can be little doubt, when we reflect either upon the place where this species of divination was practised, or upon the import of the word by which it was denominated.

NECROPOLIS, a suburb of Alexandria, in Egypt. It signifies the City of the Dead, and was the place where temples, gardens, and superb mausoleums were erected. Here Cleopatra is said to have applied the asp to her breast, to prevent her being led in triumph by Augustus, who endeavoured to save her.

NECROSIS, *νεκρωσις*, in *Medicine*, a complete mortification of any part. It is also called *sideratio* and *sphacelus*.

NECTANEBUS, or NECTANABIS, a king of Egypt, who bravely defended his country against the Persians. His grandson of the same name formed an alliance with Agesilaus, king of Sparta, and with the assistance of that prince he quelled a rebellion of his subjects. Some time afterwards, he was joined by the Sidonians, Phœnicians, and inhabitants of Cyprus, who had revolted from the king of Persia. This powerful confederacy was soon attacked by Darius, the king of Persia, who marched at the head of his troops. Nectanebus, to defend his frontiers against so dangerous an enemy, levied twenty thousand mercenary soldiers in Greece, the same number in Libya, and sixty thousand were furnished in Egypt. But this numerous body was not equal to the Persian forces, and Nectanebus, being defeated in battle, gave up all hopes of resistance, and fled into Ethiopia, where he found a safe asylum. From that time the kingdom of Egypt became tributary to the king of Persia.

NECTAR, amongst ancient poets, the drink of the fabulous deities of the heathens; in contradistinction to their solid food, which was called *ambrosia*.

NECTARINE, a fruit differing in nothing from the common peach, of which it is a species, but in having a smoother rind and a firmer pulp.

NECTARIUM, from *nectar*, the fabled drink of the gods, is defined by Linnæus to be a part of the corolla, or appendage to the petals, appropriated for containing the honey, a species of vegetable salt under a fluid form, which oozes from the plant, and is the principal food of bees and other insects.

But notwithstanding this definition, which seems to consider the nectarium as necessary a part of the corolla as the petals, it is certain that all flowers are not provided with this appendage, neither indeed is it essential to fructifica-

K

Nectarium. tion. There is, besides, a manifest impropriety in terming the nectarium a part of the corolla. Linnæus might, with equal propriety, have termed it a part or appendage of the stamina, calyx, or pointal, as the appearance in question is confined to no particular part of the flower, but is as various in point of situation as of form. The truth is, the term *nectarium* is exceedingly vague, and, if any determinate meaning can be affixed to it, is expressive of all the singularities which are observed in the different parts of flowers.

The tube or lower part of flowers with one petal Linnæus considers as a true nectarium, because it is generally found to contain the sweet liquor formerly mentioned. This liquor Pontedera compares to that called *amnios* in pregnant animals, which enters the fertile or impregnated seeds; but that this is not at least its sole use, is evident from the circumstance, that the honey or liquor in question is to be found in flowers where there are either no seeds, or such as, from the want of male organs, cannot be impregnated. Thus the male flowers of nettle and willow, the female flowers of sea-side laurel and black bryony, the male and female flowers of clutia, kiggelaria, and butcher's broom, all abound with the honey or nectar alluded to.

Vaillant was of opinion that the nectarium formed an essential part of the corolla; for which reason he distinguished the singular appearances in fennel flower and columbine by the name of *petals*. The coloured leaves which are now termed *petals* he denominated the *flower-cup*. That the nectarium, however, is frequently distinct from the petals, is evident both from the well-known examples just mentioned, and likewise from the flowers of monkshood, hellebore, isopyrum, fennel flower of Crete, barrenwort, grass of Parnassus, chocolate nut, cherleria, and sauva-gesia.

These general observations being premised, we proceed to take a nearer and more particular view of the principal diversities, both in form and situation, of this striking appendage of the flower. 1. In many flowers the nectarium is shaped like a spur or horn; and that either in flowers of one petal, as valerian, water milfoil (*utricularia*), butterwort, and calves-snout; or in such as have more than one, as larkspur, violet, fumitory, balsam, and orchis. 2. In the following plants, the nectarium is properly a part of the corolla, as lying within the substance of the petals: Ranunculus, lily, iris, crown imperial, water-leaf, mouse-tail, ananas or pine-apple, dog's-tooth violet, piperidge bush, vallisneria, hermannia, uvularia, and swertia. 3. The nectarium is frequently placed in a series or row within the petals, though entirely unconnected with their substance. In this situation it often resembles a cup, as in narcissus. A nectarium of this kind is said by Linnæus to crown the corolla. The following are examples: Daffodil, sea daffodil, campion, viscous campion, swallow-wort, stapelia, cynanchum, nepenthes, cherleria, balsam-tree, African spiræa, witch-hazel, olax, and passion-flower. 4. In Indian cress, buckler, mustard, Barbadoes cherry, and monotropa, the nectarium is situated upon or makes part of the calyx. 5. The nectarium in bastard flower-fence is seated upon the antheræ or tops of the stamina; whence the name *adenanthera*, or *glandular anthera*, which has been given to this genus of plants. In the following it is placed upon the filaments: Bean-caper, bay, fraxinella, marvel of Peru, bell-flower, lead-wort, roella, and commelina. 6. In hyacinth, flowering-rush, stock July flower, and rocket, the nectarium is placed upon the seed-bud. 7. In honey-flower, orpine, buck-wheat, collinsonia, lathræa, navelwort, mercury, clutia, kiggelaria, sea-side laurel, and African spiræa, it is attached to the common receptacle. Lastly, In ginger, nettle, dyer's weed, heart-seed, costus, turmeric, grewia, bastard orpine, vanelloe,

shew-tree, and willow, the nectarium is of a very singular construction, and cannot properly fall under any of the foregoing heads. Nedjed.

In discriminating the genera, the nectarium often furnishes an essential character.

Plants which have the nectarium distinct from the petals, that is, not lodged within their substance, are affirmed by Linnæus to be generally poisonous. The following are adduced as examples, viz. monkshood, hellebore, columbine, fennel-flower, grass of Parnassus, barren-wort, olean-der, marvel of Peru, bean-caper, succulent swallow-wort, fraxinella, and honey-flower.

NEDJED, a central province of Arabia. The name signifying high or elevated ground, is applied to this country in opposition to Tchama, or "low lands," which is applied to the tracts of low land along the coast by which the border of high land in Arabia is encompassed. It is described by Burckhardt as an oblong tract, extending between three and four days' journey from west to east, and two journeys in breadth from south to north. It is a cultivated territory, the most populous portion of Arabia, irrigated by many ancient wells lined with stone, which are ascribed by the inhabitants to a primeval race of giants. These wells are from twenty-five to thirty fathoms deep, being mostly the property of individuals, who exact a certain contribution from the tribes whose cattle they supply with water. Within this province there are above twenty-six small towns or villages. The chief town is Bereyda, where the sheikh resides. Under the Wahabees Derayah became a place of note. Nedjed is celebrated throughout Arabia for its excellent pastures, which, after rain, abound even in its deserts, and feed an excellent breed of camels, more numerous here than in any other of the Arabian provinces of equal extent. It is called the mother of camels, and Arabs resort to it from all quarters for the supply of their own herds; it also furnishes a constant supply, not only to Hedjaz, but to Syria and Yemen. A camel in Nedjed costs ten dollars. There is also an excellent breed of horses in this country, so remarkable that the finest blood Arab horses are properly denoted Nedjed horses. But the temporary ascendancy of the Wahabees caused a diminution of the breed, as many of the Arabs sold their horses to foreign ports, lest they should be pressed into the service of the Wahabee chief, who frequently required cavalry. Nedjed is subject to scarcity, caused by the failure of rain, and consequently of herbage. This soon affects the cattle of the Bedouins, who seldom expect in this country more than three or four successive years of plenty, though absolute famine does not occur above once in ten or fifteen years. It is generally accompanied by epidemical diseases, much like the plague, consisting of violent fevers, which prove fatal to great numbers. Nedjed is peopled by small tribes of Bedouins, who never leave it, and by settlers inter-married with them, and often travelling as merchants to Damascus, Bagdad, Medina, Mekka, and Yemen. Here the pure manners of the Arabs continue unaltered by conquest, and retain all their original simplicity; nor have they been contaminated by an influx of strangers; for if we except the caravans of pilgrims travelling from Bagdad to Mekka, no foreigners ever pass through Nedjed. "For this reason," says Burckhardt, "I consider Nedjed and the mountains between Tayf and Sanaa as the most interesting portion of Arabia, affording more objects of inquiry to a traveller than any other part of the peninsula." Those who are settled here as travelling merchants export camels and woollen cloaks, of which the best are manufactured at El Hasse; and from Bagdad they receive rice, the produce of the banks of the Tigris, and articles of dress, especially the keffies or handkerchiefs, striped, green, and yellow, made of cotton, wool, or silk. The Bedouins wear these over their bonnets. From Mekka they obtain coffee, drugs, and per-

Needham. fumes, much used amongst them, particularly a perfume much valued which comes from Mocha. A spirit of commerce prevails generally amongst the inhabitants of Nedjed, where the merchants are wealthy, and of better repute for honesty than most of the eastern traders. The settlers are generally armed with matchlocks, and they constituted, during the ascendancy of the Wahabee power, the best portion of their infantry. They are generally successful in repelling the inroads of the other wandering Arabs on their pastures. Saltpetre being abundant, every family makes its own yearly provision of gunpowder.

NEEDHAM, JOHN TUBERVILLE, was born at London on the 10th of September, in the year 1713. His parents were descended from ancient and noble families. His father, who had once possessed a considerable patrimony at Hilston, in the county of Monmouth, was of the younger and Catholic branch of the Needham family; whilst the head of the elder and Protestant branch was Lord Kilmory, created viscount in the year 1625. The father of Mr Needham died young, and left but a small fortune to his four children. His eldest son, who is the subject of this article, prosecuted his studies under the secular clergy of the English college at Douay, where he took orders, taught rhetoric for several years, gave eminent proofs of sagacity and genius, and surpassed all the other professors of that seminary in the knowledge of experimental philosophy. In 1740, he was engaged by his superiors in the service of the English mission, and was intrusted with the direction of the school erected at Twyford, near Winchester, for the education of the Roman Catholic youth. In 1744, he was appointed professor of philosophy in the English college at Lisbon, where, on account of his bad health, he remained only fifteen months. After his return, he passed at London and Paris several years, which were principally employed in microscopical observations, and in other branches of experimental philosophy. The results of these observations and experiments were published in the Philosophical Transactions of the Royal Society of London in 1749, and at Paris in 1750 in one volume 12mo; and an account of them was also given by M. de Buffon, in the first volumes of his Natural History. An intimate connection existed between the illustrious French naturalist and Mr Needham; they made their experiments and observations together, though the results and systems which they deduced from the same objects and operations were totally different. Mr Needham was admitted as a member of the Royal Society of London in the year 1747, and of the Antiquarian Society some time afterwards. From the year 1751 to 1767 he was chiefly employed in finishing the education of several English and Irish noblemen, by attending them as tutor in their travels through France, Italy, and other countries. He then retired from this wandering life to the English seminary at Paris, and, in 1768, was chosen by the Royal Academy of Sciences in that city a corresponding member.

When the regency of the Austrian Netherlands, desirous to promote the revival of philosophy and literature in that country, formed the project of an imperial academy, which was preceded by the erection of a small literary society to prepare the way for its execution, Mr Needham was invited to Brussels by the Count de Cobentzel and the president Neny, and was successively appointed chief director of both these foundations. He held this place, together with some ecclesiastical preferments he had obtained in the Low Countries, until his death, which happened on the 30th of December 1781. His piety, temperance, and purity of manners, were eminent; his attachment to the doctrines and duties of Christianity was inviolable. His opposition to modern infidels was indefatigable, and even passionate; but his probity was untainted. He was incapable of every species of duplicity; his beneficence was universal, and

his unsuspecting candour rendered him often the dupe of Needham-
perfidy. Market

The papers of Mr Needham, inserted in the Philosophical Transactions, are contained in vols. xlii. xlv. and li., and treat, 1. of tubulous concretions; 2. of worms in smutty corn, observed with the microscope; 3. of some electrical experiments made at Paris; 4. of Buffon's burning mirror; 5. of the generation, composition, and decomposition of animal and vegetable substances; and, 6. of the discovery of asbestos in France. Again, his works printed at Paris in French embrace, 1. New Microscopical Discoveries, 1745; 2. The same enlarged, 1750; 3. Observations on the Generation of Organized Bodies, 1769. He had also a considerable share in the well-known controversy respecting the origin of the Chinese, and adopted the opinion of M. de Guignes, that that people are descended from the ancient Egyptians and Phœnicians. (See the article HIEROGLYPHICS.) He arrived at this conclusion from comparing the characters upon the breast and forehead of a bust in the museum of Turin, supposed to be of Egyptian origin, with those of a Chinese dictionary in the Vatican, which had been printed at Pekin, and from perceiving a considerable resemblance between the characters on the one and contained in the other. The result of his investigation he published in a pamphlet, entitled *De Inscriptione quadam Ægyptiaca Taurini inventa, et characteribus, Ægyptiis olim et Sinis communibus exarata*, 1761, in 8vo. Nothing could be fairer or more candid than the manner in which Mr Needham proceeded in comparing the characters on the bust with those in the dictionary; but the theory deduced from this comparison is nevertheless entirely groundless and imaginary. In all forms of hieroglyphical writing, such casual coincidences may easily be detected, because picture-writing is the original basis of each; and hence the existence of such resemblances affords no proof whatever of one nation being descended from, or in any way connected with, another. But there is scarcely any similarity between the Chinese characters and the Egyptian hieroglyphs. The former were originally mere rude delineations of external objects, which, in process of time, came to be variously combined and modified, until they assumed the peculiar forms in which we now find them. The latter, however, were constructed on a far more complex and artificial principle, and of their aggregate number only a small portion can be referred to picture-writing. To seek resemblances, therefore, amongst things so disparate, is rather to indulge the fancy than to prosecute rational inquiry.

NEEDHAM-MARKET, a town of the county of Suffolk, in the parish of Barking, and hundred of Bosmere-cum-Claydon, seventy-four miles from London. It is well built, has a market on Wednesday, and had formerly some manufactures of cloth, which are now abandoned. The population amounted in 1801 to 1348, in 1811 to 1301, in 1821 to 1300, and in 1831 to 1466.

NEEDLE, a very common little instrument, made of steel, pointed at one end, pieced at the other, and employed in sewing, embroidery, tapestry, and the like.

Needles form a very considerable article in commerce; and as there is scarcely any commodity cheaper, the consumption of them is almost incredible. The sizes vary from No. 1, the largest, to No. 25, the smallest. In the manufacture of needles, German and Hungarian steel is in general preferred.

In making this article, the first thing is to pass the steel through a coal fire, and under a hammer, to bring it out of its square figure into a cylindrical one. This being done, it is drawn through a large hole of a wire-drawing iron, and returned into the fire, and drawn through a second hole of the iron smaller than the first; and thus successively from hole to hole, till it has acquired the degree of fineness required for that species of needles; observing, every

Needle.

Needle. time it is drawn, that it be carefully greased over with lard, to render it more manageable. The steel, thus reduced to a fine wire, is cut in pieces of the length of the needles intended; and these pieces are flattened at one end on the anvil, in order to form the head and eye. They are then put into the fire to soften them farther, and thence taken out and pierced at each extreme of the flat part on the anvil, by force of a puncheon of well-tempered steel, and laid on a leaden block, to bring out, with another puncheon, the little piece of steel remaining in the eye. The corners are then filed off the square of the heads, and a little cavity is filed on each side of the flat of the head; the point is then formed with a file, and the whole filed over. They are next laid to heat red hot on a long narrow iron, crooked at one end, in a charcoal fire; and when taken out thence, they are thrown into a bason of cold water to harden. On this operation a good deal depends; too much heat burns them, and too little leaves them soft; the medium is only learned by experience. When they are thus hardened, they are laid in an iron shovel, on a fire more or less brisk, in proportion to the thickness of the needles, taking care to move them from time to time. This serves to temper them, and take off their brittleness; but great care must be taken as to the degree of heat applied. They are then straightened one after another with the hammer, the coldness of the water used in hardening them having twisted the greater part of them.

The next process is that of polishing them. To effect this, the workmen take twelve or fifteen thousand needles, and range them in little heaps against each other upon a piece of new buckram sprinkled with emery dust. The needles being thus disposed, emery dust is thrown over them, which is again sprinkled with oil of olives; at last the whole is made up into a roll, well bound at both ends. This roll is then laid on a polishing table, and over it a thick plank loaded with stones, which two men work backwards and forwards a day and a half, or two days successively; by which means the roll is continually agitated by the weight and motion of the plank over it, and the needles withinside, being rubbed against each other with oil and emery, are insensibly polished. After polishing, they are taken out, and the filth washed off them with hot water and soap; they are then wiped in hot bran, a little moistened, placed with the needles in a round box, suspended in the air by a chord, which is kept stirring till the bran and needles be dry. The needles being thus wiped in two or three different brans, are taken out and put in wooden vessels, to have the good separated from those whose points or eyes have been broken either in polishing or wiping; the points are then all turned the same way, and smoothed with an emery stone turned with a wheel. This operation finishes them, and there remains nothing but to make them up into packets of 250 each. Needles were first made in England by a native of India, in 1545, but the art was lost at his death; it was, however, recovered in 1560, by Christopher Greening, who settled with his three children at Long Crendon in Bucks, where the manufactory has been carried on from that time to the present day.

Dipping-NEEDLE, or *Inclinator* Needle, a magnetical needle, so hung that, instead of playing horizontally, and pointing out north and south, one end dips or inclines to the horizon, and the other points to a certain degree of elevation above it. See the article **MAGNETISM**.

Magnetical NEEDLE, in *Navigation*, a needle touched with a loadstone, and sustained on a pivot or centre, on which playing at liberty, it directs itself to certain points in or under the horizon. See the article **MAGNETISM**.

NEEDLES, sharp pointed rocks north of the Isle of Wight. They are situated at the western extremity of the island, which is a point of high land from which they have been disjoined by the washing of the sea. There were former-

ly three of these lofty white rocks, the tallest of which, called *Lot's Wife*, rose 120 feet above low-water mark, and in its shape resembled a needle; but being undermined by the constant efforts of the waves, it was thrown down, and totally disappeared.

NEEDWOOD FOREST, in Staffordshire, between the Trent, Dove, and Blythe, and near Uttoxeter, is said to exceed all the forests in England in the excellence of its soil and the fineness of its turf.

NEELAB, a town of Hindustan, in the province of Lahore, situated on the east bank of the Indus, and thirty miles south-south-west from Attock. Long. 70. 53. E. Lat. 32. 50. N.

NEELAHCUNDAH, a town of the Afghan territories, in the province of Lahore, on the Indus, forty-seven miles south-south-east from Attock. Long. 71. 49. E. Lat. 32. 38. N.

NEELGOUND, a fortress and district of the south of India, province of Bejapoor, situated on the Malpurba River. It is now included in the British territories.

NEELGUNGE, a town of Hindustan, in the province of Oude, in the vicinity of which indigo is produced in abundance; it is fourteen miles west by south from Lucknow. Long. 80. 42. E. Lat. 26. 47. N.

NE EXEAT REGNO, in English law, is a writ to restrain a person from going out of the kingdom without the king's license.

NEFASTI DIES, in Roman antiquity, an appellation given to those days in which it was not allowed to administer justice, or to hold courts. They were so called because *non fari licebat*, the prætor was not allowed to pronounce the three solemn words or formulas of the law, *do, dico, addico*, I give, I appoint, I adjudge. These days were distinguished in the calendar by the letter N. for *nefasti*; or N. P. *nefastus primo*, when the day was only *nefastus* in the forenoon, or first part. The days of a mixed kind were called *intercisi*.

NEGADA, more properly **ANEGADA**, the most northern of the cluster of islands known by the name of the Virgin Islands, in the West Indies, and unhappily celebrated for the number of shipwrecks, in many cases accompanied with a heavy loss of life, which it has occasioned. It was first permanently settled by individuals who hoped to reap considerable advantages by collecting the spoil of the vessels wrecked on its inhospitable shores. They found that the loose ground which covered it was capable of bearing provision crops, and even cotton; whilst the rearing of stock, and the sale of the underwood, which was progressively cleared away, and, being very full of gum, had a preference in the market of St Thomas, furnished a further resource. The great object, however, always has been the wreck of vessels; and the indolence of the inhabitants is only thoroughly roused by the cry of "a vessel on the reefs." The moment this is raised, all becomes activity and bustle. Boats and small craft of every description push off towards the scene of destruction, and both skill and intrepidity are exercised to the uttermost to get first on board. The surface of Anegada is the production of the tribe of *lithophytæ*, based, it is presumed, on a submarine elevation. The appearance of the island when approached is remarkable. First, single trees show themselves on the horizon; then the most elevated part of the island, called Frank's Landing, which may be descried eight miles off in clear weather; and, last of all, the lower land. Its greatest length is 10.07 English miles, and its greatest breadth, which is about the middle, 4.25 English miles; but it afterwards diminishes towards both extremities. The reef by which it is surrounded approaches nearest on the north side of the island, where at one point it unites with the shore. Generally speaking, the distance of the reef from the island is inconsiderable on the northern, west-

Needwood
Forest
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Negada.

Negapatam ^{||}
^{Negative}
^{Sign.} ern, and partly on the southern side. To the eye Anegada appears a dead flat, with only a turpentine or loblolly tree overlooking the underwood. However, the ground rises gradually from north to south, about sixty feet. There is some rather productive soil on the island, and a great number of ponds, which, in long-continued dry weather, produce considerable quantities of salt. There is abundance of fresh water; and the surrounding sea abounds with good fish, as do also the ponds. There are some rare specimens of plants in Anegada. The feathered tribes are very numerous; and there is an abundance of domestic animals. The population of Anegada consists at present of eleven white and twenty-one coloured and black families.

NEGAPATAM, a considerable seaport in the south of India, and province of Tanjore. It is well fortified, and has a regular citadel of a pentagonal form, with wet ditches. It has no considerable trade; but is frequently touched at by ships for refreshments, which are plentiful. The town lies at the north side of the citadel, near which is the mouth of a small river, capable of receiving vessels which draw little water. At the mouth of the river there is a bar, over which the surf breaks with great violence in bad weather, and renders the entrance dangerous. The anchoring place is about three miles from the shore, opposite the town, where there is very little current; and to the south-east of the town, at the distance of five miles, there is a shoal above five miles in length, having from three to six fathoms water on it. It was originally a small village, but was fortified and improved by the Portuguese. In 1660, it was taken from them by the Dutch, who strengthened its fortifications, and made it the capital of their settlements on the Coromandel coast, where they established a mint. Under their rule it enjoyed a long period of tranquillity; its trade increased, and it became a very flourishing city. In 1781 it was besieged and taken by the British with about 4000 troops, and was finally ceded to them at the peace of 1783; since which period the fortifications have been neglected, and the trade has been transferred to other places. Long. 79. 55. E. Lat. 10. 43. N.

NEGATION, in *Logic*, is an act of the mind affirming one thing to be different from another; as that the soul is not matter. See *LOGIC*.

NEGATIVE, in general, something which implies a negation. Thus we say negative quantities, negative powers, negative signs, and the like.

NEGATIVE SIGN. The use of the negative sign, in algebra, is attended with several consequences which at first are admitted with difficulty, and has sometimes given occasion to notions which appear to have no real foundation. This sign implies, that the real value of the quantity represented by the letter to which it is prefixed is to be subtracted; and it serves, with the positive sign, to keep in view what elements or parts enter into the composition of quantities, and in what manner, whether as increments or decrements, that is, whether by addition or subtraction. It serves therefore to express a quantity of an opposite quality to the positive, as a line in a contrary position, a motion with an opposite direction, or a centrifugal force in opposition to gravity; and thus often saves the trouble of distinguishing and demonstrating separately the various cases of proportions, and preserves in view their analogy. But as the proportions of lines depend on their magnitude only, without regard to their position, and motions and forces are said to be equal or unequal, in any given ratio, without regard to their directions; and, in general, the proportion of quantity relates to their magnitude only, without determining whether they are to be considered as increments or decrements; so there is no ground to imagine any other proportion of $-b$ and $+a$ (or of -1 and 1) than that of the real magnitude of the quantities repre-

sented by b and a , whether these quantities are, in any particular case, to be added or subtracted. It is the same thing to subtract the decrement as to add an equal increment, or to subtract $-b$ from $a - b$, as to add to it $+b$. And because multiplying a quantity by a negative number implies only a repeated subtraction of it, the multiplying $-b$ by $-n$ is subtracting $-b$ as often as there are units in n ; and is therefore equivalent to adding $+b$ so many times, or the same as adding $+nb$. But if we infer from this, that 1 is to $-n$ as $-b$ to nb , according to the rule, that unit is to one of the factors as the other factor is to the product, there is no ground to imagine that there is any mystery in this, or any other meaning than that the real magnitudes represented by 1 , n , b , and nb are proportional. For that rule relates only to the magnitude of the factors and product, without determining whether any factor, or the product, is to be added or subtracted. But this must likewise be determined in algebraic computations; and such is the proper use of the rules concerning the signs, without which the operation could not proceed. Because a quantity to be subtracted is never produced in composition by any repeated addition of a positive, or repeated subtraction of a negative, a negative square number is never produced by composition from the root. Hence $\sqrt{-1}$, or the square root of a negative, implies an imaginary quantity; and, in resolution, it is a mark or character of the impossible cases of a problem, unless it is compensated by another imaginary symbol or supposition, when the whole expression may have a real signification. Thus $1 + \sqrt{-1}$, and $1 - \sqrt{-1}$, taken separately, are imaginary, but their sum is 2 ; as the conditions that would separately render the solution of a problem impossible, in some cases destroy each other's effect when conjoined. In the pursuit of general conclusions, and of simple forms representing them, expressions of this kind must sometimes arise where the imaginary symbol is compensated in a manner that is not always so obvious.

By proper substitutions, however, the expression may be transformed into another, in which each particular term may have a real signification as well as the whole expression. The theorems which are sometimes briefly discovered by the use of this symbol may be demonstrated without it by the inverse operation, or in some other way; and though such symbols are of some use in the computations by the method of fluxions, their evidence cannot be said to depend upon arts of this kind.

NEGINOTH. This term is found before some of the Psalms, as Psalm lxvii. It signifies *stringed instruments of music*, to be played on by the fingers, or female musicians; and the titles of those Psalms where this word is found may be thus translated: "A psalm of David to the master of music, who presides over the stringed instruments."

NEGOMBO, a large and populous village in the island of Ceylon, advantageously situated for carrying on the inland trade; particularly with Colombo, by a branch of the Mullivaddy River. It has a fort, erected by the Dutch, for the protection of the cinnamon cutters, which still remains; and there are, besides, three long ranges of buildings which serve for barracks and storehouses. The neighbouring county produces in abundance cinnamon and rice, and the gardens are well stocked with vegetables. This place was taken without opposition by the British in 1796. Long. 79. 49. E. Lat. 7. 19. N.

NEGRAIS ISLE, a small island situated at the western mouth of the Irrawaddy River, in the kingdom of Ava. It has an excellent harbour, without exception the most secure in the Bay of Bengal, as a ship launches at once into the open sea, and may work to the southward without any other impediment except what the monsoon opposes. Cape Negrais, the south-westernmost extremity of India beyond

Neginoth
^{||}
Negrais
Isle.

Negro.

the Ganges, is in long. 93. 15. E. and in lat. 16. N., and is known by a temple of Buddha erected on it. This island was occupied by the British in 1697, and it was supposed that it would entirely command the trade of Pegu, and form a secure harbour for the British ships during the monsoons. But these hopes proved fallacious, and the settlement was withdrawn. In the year 1757 the island was ceded to the British by Alompra, the Burman emperor, and the place was formally taken possession of in 1757. In 1759 some disputes having arisen between the Burman governor and the English resident, the place was suddenly attacked in the month of October, and all the British who could not effect their escape were suddenly put to death. Since this period the Burmans have been excessively jealous of any visits from Europeans, and will not permit any ships to pass up the Bassein branch of the river.

NEGRO, *homo pelle nigra*, a name applied to a variety of the human species, entirely black, and found in the torrid zone, especially in that part of Africa which lies within the tropics. In the complexion of negroes we meet with many various shades; but they likewise differ from other men in the features of their face. Round cheeks, high cheek-bones, a forehead somewhat elevated, a short, broad, flat nose, thick lips, small ears, ugliness, and irregularity of shape, characterize their external appearance.

The origin of the negroes, and the cause of their remarkable difference in colour from the rest of the human species, have much perplexed philosophical inquirers. Mr Boyle has observed, that it cannot be produced by the heat of the climate; for although the heat of the sun may darken the colour of the skin, yet experience does not show that it is sufficient to produce a new blackness like that of the negroes. In Africa itself, several nations of Ethiopia are not black; nor were there any blacks originally in the West Indies. In many parts of Asia under the same parallel with the African region inhabited by the blacks, the people are only tawny. Dr Barrière alleges that the gall of negroes is black, and, being mixed with their blood, is deposited between the skin and scarf-skin. Dr Mitchell of Virginia, in the Philosophical Transactions, has endeavoured, by many learned arguments, to prove that the influence of the sun in hot countries, and the manner of life of their inhabitants, are the remote causes of the colour of the negroes, Indians, and other races. Lord Kames, on the other hand, contends, along with many others, that no physical cause is sufficient to change the colour, and the regular features of white men, to the dark hue and the deformity of the negro. The arguments of these writers have been examined with much acuteness and ingenuity by Dr Stanhope Smith of New Jersey, Dr Hunter, and Professor Zimmerman, who have rendered it in a high degree probable that the action of the sun is the original and chief cause of the black colour, as well as of the distorted features, of the negro. In the article MAN the reader will find opinions stated which have been advanced in regard to the varieties of the human race.

The most serious charge brought against the poor negroes is, that of the *vices* which are said to be natural to them. If, indeed, they be such as their enemies represent them, treacherous, cruel, revengeful, and intemperate, by a necessity of nature, they must be of a different race from the whites; for although all these vices abound in Europe, it is evident that they proceed not from nature, but from bad education, which gives to the youthful mind such deep impressions as no future exertions can completely eradicate. Let us inquire coolly if the vices of the negroes may not have a similar origin.

In every part of Africa with which the nations of Europe have any commerce, slavery of the worst kind prevails. Three fourths of the people are slaves to the rest, and the children are born to no other inheritance. Most parts of

Negro.

the coasts differ in their governments; some are absolute monarchies, whilst others approach to an aristocracy. In both the authority of the chief or chiefs is unlimited, extending to life, and it is exercised as often as caprice dictates, unless death is commuted into slavery, in which case the offender is sold; but if the shipping will not buy the person condemned, he is immediately put to death. Fathers of free condition have power to sell their children, but this power is very seldom enforced. In Congo, however, a father will sell a son or daughter, or perhaps both, for a piece of cloth, a collar or girdle of coral or beads, and often for a bottle of wine or brandy. A husband may have as many wives as he pleases, and repudiate or even sell them, though with child, at his pleasure. The wives and concubines, though it be a capital crime for the former to break their conjugal faith, have a way of ridding themselves of their husbands, if they have set their affections upon a new gallant, by accusing them of some crime for which the punishment is death. In a word, the bulk of the people in every state of Africa are born slaves to great men, reared as such, held as property, and as property sold. There are indeed many circumstances by which a free man may become a slave, such as being in debt, and not able to pay; and in some of these cases, if the debt be large, not only the debtor, but his family likewise, become the slaves of his creditor, and may be sold. Adultery is commonly punished in the same manner, both the offending parties being sold, and the purchase-money paid to the injured husband. *Obi*, or pretended witchcraft, in which all the negroes firmly believe (see WITCHCRAFT), is another, and a very common offence, for which slavery is adjudged as a suitable punishment; and it extends to all the family of the offender. There are various other crimes which subject the offender and his children to be sold; and it is more than probable, that if there were no buyers, the poor wretches would be murdered without mercy.

In such a state of society, what dispositions can be looked for in the people, but cruelty, treachery, and revenge? Even in the civilized nations of Europe, blessed with the lights of law, science, and religion, some of the lower orders of the community consider it as a very trivial crime to defraud their superiors; whilst almost all look up to them with stupid malevolence or rancorous envy. That a depressed people, when they get power into their hands, become revengeful and cruel, the present age affords a dreadful proof in the conduct of the anarchists of a neighbouring nation; and is it wonderful that the negroes of Africa, unacquainted with moral principles, blinded by the cruelest and most absurd superstitions, and whose customs tend to eradicate from the mind all natural affection, should sometimes display to their lordly masters of European extraction the same spirit which was so generally displayed by the lower orders of Frenchmen towards their ecclesiastics, their nobles, and the family of their murdered sovereign? When we consider that the majority of the negroes groan under the most cruel slavery, both in their own country, and in every other where they are to be found in considerable numbers, it cannot excite surprise that they are in general treacherous, cruel, and vindictive. Such are the caprices of their tyrants at home, that they could not preserve their own lives or the lives of their families for any length of time, except by a perpetual vigilance, which must necessarily degenerate, first into cunning, and afterwards into treachery; and it is not conceivable that habits formed in Africa should be instantly thrown off in the West Indies, where they become the property of men whom some of them must consider as a different race of beings.

But the truth is, that the bad qualities of the negroes have been greatly exaggerated. Mr Edwards, in his valuable History of the West Indies, assures us that the Mandingo negroes display such gentleness of disposition

Negro. and demeanour, as would seem the result of early education and discipline, were it not that, generally speaking, they are more prone to theft than any of the African tribes. It has been supposed that this propensity, amongst other vices, is natural to a state of slavery, which degrades and corrupts the human mind in a deplorable manner; but why the Mandingos should have become more vicious in this respect than the rest of the natives of Africa in the same condition of life, is a question he cannot answer.

"The circumstances which," according to the same author, "distinguish the Koromantyn or Gold Coast negroes from all others, are firmness both of body and mind; a ferociousness of disposition; but withal, activity, courage, and a stubbornness, or what an ancient Roman would have deemed an elevation of soul, which prompts them to enterprises of difficulty and danger, and enables them to meet death, in its most horrid shape, with fortitude or indifference. They sometimes take to labour with great promptitude and alacrity, and have constitutions well adapted for it; for many of them have undoubtedly been slaves in Africa. But as the Gold Coast is inhabited by various tribes, which are engaged in perpetual warfare and hostility with each other, there cannot be a doubt that many of the captives taken in battle, and sold in the European settlements, were of free condition in their native country, and perhaps the owners of slaves themselves. It is not wonderful that such men should endeavour, even by means the most desperate, to regain the freedom of which they have been deprived; nor do I conceive that any further circumstances are necessary to prompt them to action, than that of being sold into captivity in a distant country. One cannot surely but lament," says our author, "that a people thus naturally intrepid, should be sunk into so deplorable a state of barbarity and superstition; and that their spirits should ever be broken down by the yoke of slavery. Whatever may be alleged concerning their ferociousness and implacability in their present notions of right and wrong, I am persuaded that they possess qualities which are capable of, and well deserve, cultivation and improvement."

"Very different from the Koromantyns are the negroes imported from the Bight of Benin, and known in the West Indies by the name of Eboes. So great is their constitutional timidity and despondency of mind, as to occasion them very frequently to seek, in a voluntary death, a refuge from their own melancholy reflections. They require, therefore, the gentlest and mildest treatment to reconcile them to their situation; but if their confidence be once obtained, they manifest as great fidelity, affection, and gratitude, as can reasonably be expected from men in a state of slavery. The females of this nation are better labourers than the men, probably from having been more hardly treated in Africa."

"The natives of Whidah, who in the West Indies are generally called *Papaws*, are unquestionably the most docile and best disposed slaves that are imported from any part of Africa. Without the fierce and savage manners of the Koromantyn negroes, they are also happily exempt from the timid and desponding temper of the Eboes. The cheerful acquiescence with which these people apply to the labours of the field, and their constitutional aptitude for such employment, arise, without doubt, from the great attention paid to agriculture in their native country. Bosman speaks with rapture of the improved state of the soil, the number of villages, and the industry, riches, and

obliging manners of the natives. He observes, however, that they are much greater thieves than those of the Gold Coast, and very unlike them in another respect, namely, in the dread of pain, and the apprehension of death. They are, says he, so very apprehensive of death, that they are unwilling to hear it mentioned, for fear that alone should hasten their end; and no man dares to speak of death in the presence of the king, or any great man, under the penalty of suffering it himself, as a punishment for his presumption. He relates further, that they are addicted to gaming beyond any people of Africa. All these propensities are observable in the character of the Papaws in a state of slavery in the West Indies. That punishment which excites the Koromantyn to rebel, and drives the Ebo negro to suicide, is received by the Papaws as the chastisement of legal authority, to which it is their duty to submit patiently. The case seems to be, that the generality of these people are in a state of absolute slavery in Africa, and, having been habituated to a life of labour, they submit to a change of situation with little reluctance."

In a word, as the colour, and features, and moral qualities of the negroes may be accounted for by the influence of climate and the modes of savage life, so there is good reason to believe that their intellectual endowments may likewise be referred to circumstances, and that they are equal to those of the whites who have been found in the same hapless situation.

NEGROLAND. See AFRICA and NIGRITIA.

NEGROPONT, an island in the Mediterranean, the ancient Eubœa, extending in north latitude from 37. 56. to 39. 8., and in east longitude from 22. 41. to 24. 33. It is connected with the mainland by a very long bridge, and is a mountainous country, inhabited by sixty thousand persons, two thirds of whom are Greeks. The capital is a city of the same name, being the ancient Chalcis, and is estimated to contain sixteen thousand inhabitants, most of whom are Turks. It is situated in long. 23. 34. E. and lat. 38. 31. N.

NEGRO, RIO, a large river of Patagonia, in South America. The banks of this river, as well as the numerous islands with which it is in many parts studded, are covered with low willows, from which cause it is sometimes called the Rio Sauces. Its Indian name is Cusu-Leubu, signifying Rio Negro, or the Black River, from the dark hue of its waters.¹ The results of the expedition alluded to in the note were important, although not so completely satisfactory as could have been wished, as the large affluent from the north, supposed to be Diamante, was not examined. But the great point established was, that it is possible to navigate the main stream of the Rio Negro from its mouth, in the Southern Atlantic, to the very foot of the Cordillera of Chili, within fifty miles of Valdivia, upon the shores of the Pacific, a distance of about 525 miles without including the windings of the river. From its mouth in south latitude 41° 5', to the great island of Choleechel or Chuelechel, in latitude 39°, its general course tends to the north-north-west, although in some parts it is exceedingly tortuous. As far as this point, the bottom of the river is sand, and the country is described as an arid sandy level, destitute of vegetation, excepting some insulated patches along the shore, which being from time to time flooded, are covered with good pasturage. The island of Choleechel, which constitutes so conspicuous a feature in the map of the river, is twenty-seven miles in length

¹ This river, which forms so important a feature in the geography of that part of South America, has hitherto been laid down solely on the authority of Father Falkner's work upon Patagonia, published in this country in the year 1775. In the year 1836, however, the Royal Geographical Society of London published a correct account and map of it, which were derived from a Journal of an Original Voyage of Discovery up the Rio Negro, performed in the years 1782-1783, by Don Basilio Villarino, who had been employed for the purpose by the Spanish government. To these we have had recourse in drawing up the above article.

Negros
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Nehavend.

and nine in width; but appears to produce nothing except pasturage. From this island to Diamante, a distance of 156 miles, the course of the river is nearly due west; its bottom is gravelly, with many pebbles, and the aspect of the country is for the most part desolate from want of vegetation. The Diamante, at its confluence with the Rio Negro, is nearly as large as the latter river; and as it appears to be the drainage of numerous streams which descend from the eastern side of the Cordillera, between the latitudes of 32° and 36°, its periodical floods must be formidable, and much greater than those of the Rio Negro. It is much intersected by small islands overgrown with stunted willows. The low lands along the shore are sterile, and all beyond a range of steep red cliffs, by which these are bounded, the country appeared totally destitute of herbage, not a tree being visible. From about the confluence of these two rivers, the Rio Negro takes a south-south-western direction, running between high precipitous banks, where in some parts the river was not more than five hundred yards across. After these are passed, the country becomes more level, and the stream widens. Another considerable tributary, called the Pichi Epicuntu, which descends from some of the snowy peaks of the Cordillera, flows into the Negro in lat. 39° 35' S. Farther onwards the river becomes intersected by innumerable islands, extremely shallow in some parts; and the bottom is strewn with rounded stones and boulders, which increase in size as the range of the Cordillera is approached. The windings of the river also become very large, and, from flowing in a main current nearly due south, it takes a westerly direction, and then bends to the north. The farthest point reached by Villarino was in lat. 39° 40'; and here, within fifty miles of Valdivia, his course was checked by the Indians, who appear to have been apprehensive that his expedition had for its main object the stoppage of a great pass near Choleechel, by which they were in the habit of making predatory excursions into the province of Buenos Ayres. He, in fact, points out how these marauders might be effectually kept in check by establishing a fort at the point above mentioned; and, after a lapse of fifty years, this suggestion has been carried into effect by the authorities of Buenos Ayres. In 1833 a military post was formed at the Choleechel, which will not only secure the southern parts of the republic from the hostile inroads of the Indians, but will no doubt ultimately lead to our obtaining much new and interesting information respecting a vast tract of country as yet unknown to us. The depth of the Rio Negro varies much, as well as the current, depending in some measure on the breadth of the bed of the river; and it is liable to great changes in the time of the floods, which are periodical, and twice in the year, from the rains in the winter, and the melting of the snows in summer. With regard to its breadth, nothing satisfactory can be stated, as it varies exceedingly at all times, and widens and contracts at different seasons of the year.

NEGROS, one of the Philippine Islands, in the Eastern Seas, situated due north of Luzon or Laconia, about the 123d degree of east longitude. It is about 145 miles in length by twenty-five in average breadth, and is fruitful in rice, for which the inhabitants pay tribute. The island was so named by the Spaniards, from the Papuan or oriental negroes, its original inhabitants, who still inhabit the mountains, being in a state of savage independence, and continually at war with each other. Long. 122. 30. E. Lat. 10. 10. N.

NEHAVEND, or NEHANUD, a town of Persia, in the province of Irak, sixty miles south of Hamadan. It is celebrated for a battle fought there between the Saracens and Persians in the year 638, when the Sassanian dynasty was overthrown, and the Saracens established themselves on the throne of Persia.

NEHEMIAH, or NEHEMIAS, son of Hachaliah, was born at Babylon during the captivity (Nehem. i. 1, 2, *et seq.*). He was, according to some, of the race of the priests; but according to others, he was of the tribe of Judah and the royal family. Those who maintain the former opinion support it by a passage in Ezra (x. 10), where he is called a priest; but those who believe that he was of the race of the kings of Judah say that as Nehemiah for a considerable time governed the republic of the Jews, it is probable he was of that tribe to which the kings always belonged. Nehemiah mentions his brethren Hanani, and some other Jews, who, having come to Babylon during the captivity, acquainted him with the sad condition of their country; and the office of cup-bearer to the king of Persia, to which Nehemiah was promoted, is considered as a further proof that he was of an illustrious family. Lastly, he excuses himself from entering into the inner part of the temple, probably because he was only a layman (Nehem. vi. 11). "Should such a man as I flee? And who is there that, being as I am, would go into the temple to save his life?" The Scripture (Ezra, ii. 63; Nehem. vii. 65) calls him *tirshatha*, or cup-bearer; no doubt because he held this employment at the court of Artaxerxes Longimanus. He had an exceeding great tenderness for the country of his fathers, although he had never seen it; and one day, when some Jews newly arrived from Jerusalem acquainted him with the miserable state of that city, that its walls were beaten down, its gates burned, and the Jews become a reproach amongst all nations, he became so sensibly affected with this relation, that he fasted, prayed, and humbled himself before the Lord, imploring him to be favourable to the design which he had then conceived of asking the king's permission to rebuild Jerusalem. In the course of his attendance at court, he presented the cup to the king according to custom, but with a countenance sad and dejected, which the king observing, entertained some suspicion that he had conceived some evil design; but Nehemiah disclosing the occasion of his disquiet, explained the cause of his grief, upon which Artaxerxes gave him permission to go to Jerusalem, and repair its walls and gates, upon this condition, however, that he should return to court at a time appointed. Letters were accordingly made out, directed to the governors beyond the Euphrates, with orders to furnish Nehemiah with the timbers necessary for covering the towers and gates of the city, and the house designed for Nehemiah himself, who was now appointed governor of Judæa, in the year of the world 3350.

Nehemiah having arrived at Jerusalem with the king's commission, went round the city, and having viewed the condition of the walls, assembled the chief of the people, produced his commission, and exhorted them to undertake the reparation of the gates and the walls of the city. Finding every person ready to obey him, he immediately began the work. The enemies of the Jews observing these works in such forwardness, employed all the means in their power to deter Nehemiah from this undertaking, and made several attempts to surprise him; but finding that their designs had been discovered, and that the Jews were upon their guard, they had recourse to stratagem, endeavouring to draw him into an ambuscade in the fields, where they pretended they would finish the dispute at an amicable conference. But Nehemiah gave them to understand that the work he had begun required his personal attendance, and that therefore he could not meet them. He returned the same answer to four several messages that they sent, one after another, on the same subject.

Sanballat, the chief of the enemies of the Jews, together with his associates, sent information of a report that the Jews were building the walls of Jerusalem solely with the design of rendering it a place of strength, to support them in an intended revolt; and that Nehemiah had also suborned

Neiderselters. false prophets to favour his designs, and to encourage the people to choose him king; wherefore, in order to put a stop to these rumours, he advised Nehemiah to come to him, that they might confer together, and adopt such resolutions as should be found convenient. Nehemiah, however, gave himself no trouble on this account, but returned for answer, that all these accusations were false, and had been made at random. About the same time he discovered that a false prophet called Shemaiah had been corrupted by his enemies, and that some of the chief men of the city were secretly in confederacy with them. Yet all this did not discourage him; he went on with his work, and happily completed it in fifty-two days after it had been commenced.

We read in the books of the Maccabees that Nehemiah sent to search for the holy fire, which before the captivity of Babylon the priests had hidden in a dry and deep pit; but not finding any fire there, and only a thick muddy water, he sprinkled this upon the altar; whereupon the wood which had been moistened with this water took fire as soon as the sun began to appear. When this miracle came to the knowledge of the king of Persia, he caused the place to be encompassed with walls where the fire had been hidden, and granted great favours and privileges to the priests. It is recorded in the same books, that Nehemiah erected a library, in which he placed whatever he could find, either of the books of the prophets, of King David, or of such princes as had made presents to the temple. Lastly, he returned to Babylon, according to the promise which he had made to king Artaxerxes, about the thirty-second year of that prince's reign, and in the year of the world 3563; but he subsequently revisited Jerusalem, where he died in peace, about the year 3580, having governed the people of Judah for about thirty years.

The book which, in the English Bible, as well as in the Hebrew, bears the name of *Nehemiah*, is in the Latin Bible called the book of *Esdras*; and it must be confessed, that though this author speaks in the first person, and though at the first reading one would think that he had written it day by day as the transactions occurred, yet there are some things in the book which could not have been written by Nehemiah himself. For example, memorials are quoted, in which were registered the names of the priests in the time of Jonathan the son of Eliashib, and even down to the times of the high priest Jaddus, who went out to meet Alexander the Great, which must have been afterwards added.

It may well be questioned whether this Nehemiah be the same that is mentioned in Ezra, ii. 2, and Nehem. vii. 7, as one who returned from the Babylonian captivity under Zerubbabel; since from the first year of Cyrus to the twentieth of Artaxerxes Longimanus, no less than ninety-two years intervene; so that Nehemiah must at this time have been a very old man, at the lowest computation an hundred, and consequently incapable of being the king's cup-bearer, of taking a journey from Shushan to Jerusalem, and of behaving there with all the courage and activity which have been ascribed to him. We may therefore conclude that this was a different person, though of the same name, and that Tirshatha, the other name by which he is called (Ezra, ii. 63; and Nehem. vii. 65), denotes the title of his office, and, both in the Persian and Chaldaic tongues, was the general name given to the king's deputies and governors.

NEIDERSELTERS, a town of the bailiwick of Idstein, in the duchy of Nassau, in Germany, celebrated for the mineral spring which yields the water known through Europe by the name of Seltzer water. Besides what is used on the spot, more than two millions and a half of jugs of it are despatched to different countries, and produce a clear revenue of L.5000. The town is si-

VOL. XVI.

tuated in a picturesque country, and contains about 900 resident inhabitants, but receives a great deal of company during the summer season.

NEISSE, a city, the capital of a district of the same name, in Prussian Silesia. It stands at the junction of the river Biele with the Neisse, in a marshy situation, though at the height of 580 feet above the level of the sea. It is strongly fortified, especially with effective ditches, and contains an Episcopal palace, seven Catholic and two Lutheran churches. There is a Catholic college, with about 300 students, besides a large endowed grammar school. It contains 11,000 inhabitants, among whom are extensive manufacturers of linen goods; besides which, hosiery, hats, brandy, and other articles, are manufactured. Long. 17. 14. E. Lat. 51. 25. N.

NEITRA, a circle of the province of the Lower Danube, in the Austrian kingdom of Hungary. It extends over 2662 square miles, and contains a population of 348,500 persons, chiefly of the Sclavonian race; and it comprises two cities, thirty-eight market towns, and 462 villages and hamlets. The capital is a city of the same name, the seat of a bishop, containing 500 houses and 3958 inhabitants, whose chief trade is in wine. Long. 17. 58. 56. E. Lat. 48. 19. 10. N.

NEJIN, a city of Russia, in the province of Tchernigow, in what was formerly distinguished as Little Russia. It stands on the river Oster. The streets are intermixed with large gardens, filled with fruit trees of various kinds. It contains 1000 houses, two convents, and sixteen churches, all built after the model of those in Moscow, and is reckoned the handsomest town to the south of that capital. The inhabitants are about 12,000, composed, besides Russians and Kossacks, of many Greek and Armenian families. The most distinguished building is the Gymnasium Bezborodko, founded by the count of that name. It is a large edifice, adorned by a colonnade of twelve Ionic pillars, and, being surrounded by high trees, it has a truly noble appearance. It was instituted for the education of young noblemen.

NELSON, **HORATIO**, Lord Viscount, the greatest naval commander that any age or country has produced, was the son of Edmund and Catherine Nelson, and was born on the 29th of September 1758, at the parsonage house of Burnham-Thorpe, a village in the county of Norfolk, of which his father was rector. The maiden name of his mother was Suckling; her grandmother was an elder sister of Sir Robert Walpole, and the subject of this notice was named after the first Earl of Orford. Mrs Nelson died in 1767, leaving eight out of eleven children. Upon this occasion her brother, Captain Maurice Suckling, of the navy, visited Mr Nelson, and promised to take care of one of the boys. Three years afterwards, when Horatio was only twelve years of age, being at home during the Christmas holidays, he read in the county newspaper that his uncle had been appointed to the *Raisonné* of sixty-four guns, and immediately applied to his father for permission to go to sea with his uncle. The boy was then receiving his education at North Walsham; and his constitution, which was naturally weak, had been much impaired by an attack of the ague, at that time one of the most common diseases in England. But his father's circumstances were straitened, and he had no prospect of seeing them bettered; he knew that it was the wish of providing for himself by which Horatio was chiefly actuated; he also understood the boy's character, and conceived that, in whatever station he might be placed, he would, if possible, climb to the top of the tree. The uncle was accordingly written to, and gave a reluctant consent to the proposal which had been made to him. "What," said he, in reply, "has poor Horatio done, who is so weak, that he should be sent to rough it out at sea? But let him come, and the first time we go into action a

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Nelson.

Nelson. cannon-ball may knock off his head, and provide for him at once." The *Raisonné*, on board of which he was now placed as a midshipman, had been commissioned on account of the dispute respecting the Falkland Islands; but as soon as the difference with the court of Spain had been accommodated, the ship was paid off, and Captain Suckling removed to the *Triumph* of seventy-four guns, then stationed as a guard-ship in the Thames. This, however, was considered as too inactive a life for a boy, and Nelson was therefore sent a voyage to the West Indies in a merchant ship, commanded by a person who had served as master's mate under his uncle in the *Dreadnought*. He returned a practical seaman, but with no affection for the king's service, and was received by his uncle on board the *Triumph*, then lying at Chatham, in the month of July 1772.

Not many months after his return, his inherent love of enterprise was excited by hearing that two ships were fitting out for a voyage of discovery towards the North Pole. From the difficulties expected on such service, these vessels were to take out none but effective men, instead of the usual number of boys. This, however, did not deter Nelson from soliciting to be received, and by his uncle's interest he was admitted as cockswain under Captain Lutwidge, the second in command. The voyage was undertaken in consequence of an application from the Royal Society; and the Honourable Captain John C. Phipps, eldest son of Lord Mulgrave, volunteered his services to command the expedition. The *Racehorse* and *Carcass*, bombs, were selected as the strongest ships, and therefore best adapted for such a voyage; and they were taken into dock and further strengthened, to render them as secure as possible against the ice. Two masters of Greenlandmen were employed as pilots for each ship; and the first lord of the admiralty, Lord Sandwich, with a laudable solicitude, took care to see that every thing had been provided to the wish of the officers. The expedition sailed from the Nore on the 4th of June 1773, and in the course of the following month came in sight of Spitzbergen, whence they proceeded to Moffen Island, beyond which they discovered seven other islands situated in the latitude of 81. 21. north. But advancing further in search of an opening, the ships were beset with ice, in which they became suddenly wedged, no fissure of any kind being visible; and in this critical situation they remained five days, during which they were exposed to the greatest danger, and would inevitably have been destroyed if the ice had been agitated by the slightest breeze. Fortunately the weather remained singularly calm, and the ice having itself begun to drift to the westward, the ships were at length got clear. The season was now so far advanced that nothing more could have been attempted, if indeed any thing had been left untried. But the summer had been unusually favourable; and they had carefully surveyed the vast wall of ice extending for more than twenty degrees between the latitudes of 80° and 81° without discovering the smallest appearance of an opening. The expedition returned to England in October, and shortly afterwards the ships were paid off.

During this voyage Nelson gave several indications of that daring and fearless spirit which ever afterwards distinguished him. Having been appointed to command one of the boats sent out to explore a passage into the open water, he was instrumental in saving a boat belonging to the *Racehorse* from a singular but imminent danger. Some of the officers having fired at and struck a walrus, the wounded animal immediately dived, and having brought up a number of its companions, they all joined in an attack upon the boat. They wrested an oar from one of the men, and it was with the utmost difficulty that the crew could prevent them from staving or upsetting the boat, till that of the *Carcass* came up to their assistance, upon which the walruses, finding their enemies thus reinforced, dispersed.

Young Nelson exposed himself in a yet more daring manner. One night, during the middle watch, he stole unperceived from the ship with one of his comrades, and taking advantage of a rising fog, set out in pursuit of a bear. It was not long before he was missed. The fog thickened, and Captain Lutwidge and his officers became exceedingly alarmed for their safety. Between three and four in the morning the fog cleared away, when the two adventurers were seen, at a considerable distance from the ship, attacking a huge bear, which they were only enabled to keep at bay by a chasm in the ice. Captain Lutwidge, seeing their danger, fired a gun, which had the desired effect of frightening the beast; and, on their return to the ship, he sternly reprimanded young Nelson for conduct so unworthy of the office he filled. When asked what motive he could have had for leaving the ship to hunt a bear, he replied, "I wished to kill it, that I might carry the skin to my father."

The ships were paid off shortly after their return, and the youth was then placed by his uncle with Captain Farmer in the *Seahorse* of twenty guns, which was about to sail for the East Indies in the squadron of Sir Edward Hughes. In this ship he was rated as a midshipman, and attracted attention by his general good conduct. But when he had been about eighteen months in India, he felt the effects of the climate of that country, so perilous to European constitutions, and became so enfeebled by disease that he lost for a time the use of his limbs, and was brought almost to the brink of the grave. He embarked for England in the *Dolphin*, Captain Pigot, with a body broken down by sickness, and spirits which had sunk with his strength. But his health materially improved during the voyage, and his native air speedily repaired the injury it had sustained. On the 8th of April 1777 he passed, with much credit to himself, his examination for a lieutenancy, and next day received his commission as second lieutenant of the *Lowestoffe*, of thirty-two guns, then fitting out for Jamaica. In this frigate he cruised against the American and French privateers which were at that time harassing our trade in the West Indies; distinguished himself on various occasions by his activity and enterprise; and formed a friendship with his captain, Locker, of the *Lowestoffe*, which continued during his life. Having been warmly recommended to Sir Peter Parker, the commander-in-chief upon that station, he was removed into the Bristol flag-ship, and soon afterwards became first lieutenant. On the 8th of December 1788, he was appointed commander of the *Badger* brig, in which he rendered important assistance in rescuing the crew of the *Glasgow*, when that ship was accidentally set on fire in Montego Bay, Jamaica.

In the course of the following year (11th of June 1799), he obtained the rank of post-captain, and with it the command of the *Hinchinbrook* of twenty-eight guns, an enemy's merchantman, sheathed with wood, which had been taken into the service. As Count d'Estaing, with a fleet of 125 sail, men of war and transports, and a reputed force of 25,000 men, now threatened Jamaica from St Domingo, Nelson offered his services to the admiral and the governor-general, Dalling, and was appointed to command the batteries of Fort-Charles at Port-Royal, the most important post in the island. D'Estaing, however, attempted nothing with this formidable armament, and the British general was thus left to execute a design which he had formed against the Spanish colonies. This project was to take Fort San Juan, situated upon the river of that name, which flows from Lake Nicaragua into the Gulf of Mexico; to make himself master of the lake itself, and of the cities of Granada and Leon; and thus to cut off the communication between the northern and southern possessions of Spain in America. Nelson was appointed to the command of the naval department, and that of the military was committed to a major in the army. But although the gene-

Nelson.

Nelson. ral's plans were well formed, the nature of the country had not been studied so accurately as its geography. The difficulties which occurred in fitting out the expedition delayed it till the season was too far advanced; and the men were thus sent to adventure themselves, not so much against an enemy whom they might have beaten, as against a climate which would effectually do the enemy's work. Early in 1780, five hundred men, destined for this service, were convoyed by Nelson from Port-Royal to Cape Gracias a Dios in Honduras; and, on the 24th of March, they reached the river San Juan, where Nelson's services were to terminate. But not a man in the expedition had ever been up the river, or knew the distance of any fortification from its mouth. Nelson, however, not being one to turn his back when so much was to be done, resolved to carry up the soldiers, and, in spite of every difficulty, succeeded in conveying them a hundred miles up a river which none but Spaniards had navigated since the time of the buccaneers. On the 9th of April they reached a small island, called St Bartolomeo, which the Spaniards had fortified as an outpost, to command the river, in a rapid and difficult part of the navigation. Nelson, at the head of a few seamen, leaped upon the beach, and being gallantly supported by Despard, then a captain in the army, advanced against the battery, which he at once stormed, or, in his own phrase, boarded, driving away the Spaniards, and capturing their guns. The castle of San Juan, situated sixteen miles higher up, was the next object of attack. Nelson advised that it should instantly be carried by assault; but he was not the commander, and it was thought proper to observe the formalities of a siege. The attack commenced on the 13th, and the place surrendered on the 24th of April. But victory procured to the conquerors none of that relief which they had expected. No supplies of any kind were found; the castle itself proved worse than a prison; the huts which served as hospitals were surrounded with filth and putrid hides; sickness at length became general, leaving few men able to perform garrison duty; and the rains continued with scarcely any interval from April till October, when this baleful conquest was abandoned. Of 1800 men who had been sent to different posts upon this wretched expedition, not more than 380 ever returned. Nelson himself was saved by a timely removal, though not until after he had been seized with the prevailing dysentery. Having been appointed to succeed Captain Glover in the *Janus* of forty-four guns, he sailed for Jamaica; but on reaching Port-Royal he found himself so greatly reduced by the disorder, that he was compelled to ask leave to return to England, as the only means of recovery. He was taken home in the *Lyon*, by Captain, afterwards Admiral, Cornwallis, to whose care and kindness he believed himself indebted for the preservation of his life.

In three months, however, his health was so far re-established that he applied for employment; and being appointed to the *Albemarle* of twenty-eight guns, he was sent to the North Seas, and kept there during the whole winter, a mode of conduct which he deeply resented, as equally cruel to the individual, and detrimental to the service. In this cruise, however, he gained a considerable knowledge of the Danish coast and its soundings. On his return he was ordered to Quebec, and in consequence sailed for Canada. During this cruise, the *Albemarle* had a narrow escape from four French sail of the line and a frigate, which having come out of Boston, gave chase to her. Confiding in his own skill in pilotage, Nelson, perceiving that they gained on him, boldly ran amongst the numerous shoals of St George's bank, and thus escaped. In October 1782, he sailed from Quebec with a convoy of transports for New York, where he joined Lord Hood, who, with a detachment of Rodney's victorious fleet, was then at Sandy Hook. His professional merit was already so well known, that Lord

Hood, on introducing him to the Duke of Clarence, who was at that time serving as a midshipman in the *Barfleur*, told his royal highness that, if he wished to ask any questions in naval tactics, Captain Nelson could give him as much information as any officer in the fleet. In November he accompanied Lord Hood to the West Indies, and continued there in active employment till the peace of 1783, when the *Albemarle* returned to England, and was paid off.

After his arrival in England, Nelson, finding it prudent to economise his half-pay during the peace, went to France, and took lodgings at St Omers, where he remained till the spring of the following year. In the interval he had lost his favourite sister, and formed an attachment for the daughter of an English clergyman, whom his straitened circumstances alone prevented him from marrying. On his return he was appointed to the *Boreas* of twenty-eight guns, which had been ordered to the Leeward Islands as a cruiser on the peace establishment. Whilst on this station, where he found himself senior captain, and consequently second in command, he evinced the utmost zeal and activity in protecting British interests, and in causing the navigation act to be respected, especially by the Americans, who had attempted, under various pretences, to establish an independent commerce with the West India Islands; a line of conduct which involved him in much trouble, without procuring him reward or even acknowledgment, the thanks of the treasury having been transmitted to the commander-in-chief, who had thwarted instead of encouraging him in the discharge of an arduous and important duty. He had, however, something to console him amidst his perplexities. Having become acquainted with an amiable and accomplished lady, the widow of Dr Nisbet, a physician, and then only in her eighteenth year, he made proposals of marriage, which were accepted, and they were married on the 11th of March 1787, the Duke of Clarence, who had gone out to the West Indies the preceding winter, being present, by his own desire, to give away the bride. During his service upon this station he had ample opportunities of observing the scandalous practices of the contractors, prize-agents, and other persons in the West Indies connected with the naval service, and he did every thing in his power to check them, although, unhappily, without success. The *Boreas* returned to England in June, but was not paid off till the end of November, having been kept nearly five months at the *Nore* as a slop and receiving ship. Nelson was still in a very precarious state of health; and this unworthy treatment, whether it proceeded from intention or neglect, excited in his mind the strongest indignation. His resentment, however, was appeased by the favourable reception which he met with at court, when presented to his majesty by Lord Howe; and having fully explained to that nobleman the grounds upon which he had acted, he retired to enjoy the pleasures of domestic happiness at the parsonage-house at Burnham-Thorpe, which his father had given him as a residence. But the vexatious affair of the American captures was not yet terminated. He was harassed with threats of prosecution, and, in his absence on some business, a writ or notification was served on his wife, upon the part of the American captains, who now laid their damages at L.20,000. When presented with this paper, his indignation was excessive; and he immediately wrote to the treasury, that unless he was supported by government he would leave the country. "If sixpence would save me from prosecution," said he, "I would not give it." The answer he received, however, quieted his fears; he was told to be under no apprehension, for he would assuredly be supported; and here his disquietude upon this subject seems to have ended.

During the time which he spent in retirement, he repeatedly requested the admiralty not to leave him to rust in indolence; but his various applications were unsuccessful.

Nelson.

Nelson. ful. At the commencement of the French war, however, it was judged expedient to employ him; and, on the 30th of January 1793, he was appointed to the *Agamemnon* of sixty-four guns, and placed under the orders of Lord Hood, then appointed to the chief command in the Mediterranean. The limits prescribed to this article admit not of our entering into any details of his various achievements upon this station. The high opinion which Lord Hood entertained of his talents and ability, as well as courage, was manifested by the arduous services with the execution of which his lordship intrusted him. Being sent to Corsica with a small squadron to co-operate with Paoli and the party opposed to France, he undertook the siege of Bastia, and in a short time reduced it. The place capitulated on the 19th of May 1794. He next proceeded in the *Agamemnon* to co-operate with General Sir Charles Stuart in the siege of Calvi. Here Nelson had less responsibility than at Bastia; he was acting with a man after his own heart, who slept every night in the advanced battery. But the service proved not less hard than that of the former siege; twenty-five pieces of heavy ordnance having been dragged to the different batteries, mounted, and, all but three, fought by seamen. Here Nelson received a serious injury. A shot having struck the ground near him, drove the sand and small gravel into one of his eyes. He spoke of it lightly at the time, and in fact suffered it to confine him only one day; but the sight of the eye was nevertheless lost. After the fall of Calvi his services were, by a strange omission, altogether overlooked, and his name was not even mentioned in the list of wounded. Nelson felt himself not only neglected, but wronged. "They have not done me justice," said he; "but never mind, I'll have a gazette of my own." And, on another occasion, the same second-sight of glory led him to predict that one day or other he would have a long gazette to himself. "I feel," said he, "that such an opportunity will be given me. If I am in the field of glory, I cannot be kept out of sight."

Lord Hood now returned to England, and the command devolved upon Admiral Hotham. At this time the affairs of the Mediterranean wore a gloomy aspect. Tuscany had concluded peace with France; Corsica was in danger; Genoa was threatened; and the French, who had not yet been taught to feel their inferiority upon the seas, openly braved us on that element. Having a superior fleet in the Mediterranean, they now sent it out with express orders to seek the English and engage them. In the action which followed between the English fleet under Admiral Hotham, and that which had come out from Toulon, Nelson greatly distinguished himself, manœuvring and fighting his ship with equal ability and determination; and when the action was renewed the following day, he had the honour of hoisting the English colours on board of the *Ça Ira* and the *Censeur*, which both struck to him, and were the only ships of the enemy taken on that occasion.¹ About this time Nelson was made colonel of marines, a mark of approbation which he had rather wished for than expected; and soon afterwards the *Agamemnon* was ordered to Genoa to co-operate with the Austrian and Sardinian forces. This was indeed a new line of service, imposing multifarious duties, and involving great responsibility; yet it was also one for which Nelson had already evinced a singular aptitude, and in which, had he been at all seconded by the land forces, his assistance would have led to important results. But there was no unity in the views of the allied powers, no cordiality in their co-operation, no energy in

Nelson. their councils. They acted upon no fixed principle, and their officers were distinguished only for their utter incapacity. Through the gross misconduct of the Austrian general, Devins, the allies were completely defeated by an army of boys, and the French obtained possession of the Genoese coast from Savona to Voltri, thus intercepting the direct communication between the Austrian army and the English fleet. After this disgraceful affair, the *Agamemnon* was recalled, and sailed for Leghorn to refit, being literally riddled with shot, and having all her masts and yards wounded.

Sir John Jervis having arrived to take the command in the Mediterranean, Nelson sailed from Leghorn in the *Agamemnon*, which had now been repaired, and joined the admiral in Fiorenzo Bay. When the French took possession of Leghorn, he blockaded that port, and landed a force in the isle of Elba to secure Porto Ferrajo. Soon afterwards he took the island of Capraja; and the British cabinet having resolved to evacuate Corsica, he ably performed this humiliating service. He was then ordered to hoist his broad pendant on board of the *Minerve* frigate, Captain George Cockburn, and to proceed, with the *Blanche*, to Porto Ferrajo, and bring away the troops and stores left at that place. On his way thither he fell in with two Spanish frigates, the *Sabina* and *Ceres*, the former of which, after an action of three hours, during which the Spaniards lost 164 men, struck to the *Minerve*. The *Ceres*, however, had got off from the *Blanche*; and as the prisoners had hardly been conveyed on board of the *Minerve* when another enemy's frigate came up, Nelson was compelled to cast off the prize and go a second time into action. But after a short trial of strength, this new antagonist wore and hauled off; and as a Spanish squadron of two sail of the line and two frigates now came in sight, the commodore made all sail for Porto Ferrajo, whence he soon returned with a convoy to Gibraltar.

Having completed this service, he immediately proceeded to the westward in quest of the admiral, being apprehensive lest a general action should take place before he could join the fleet. Off the mouth of the Straits he fell in with the Spanish fleet, and, reaching the station off Cape St Vincent on the 13th of February 1797, he communicated this intelligence to Sir John Jervis, by whom he was now directed to shift his broad pendant on board the *Captain*, of seventy-four guns. Before sunset the signal was made to prepare for action, and to keep in close order during the night; and at day-break on the 14th the enemy were in sight. The British force consisted of two ships of 100 guns, two of 98, two of 90, eight of 74, and one of 64, with four frigates, a sloop, and a cutter; the Spaniards had one ship of 136 guns, six of 112 guns each, two of 84, and eighteen of 74, with ten frigates and a brig. The disproportion was no doubt great, but it was in a great measure neutralised by the superiority of the British crews, and the tactical ability displayed by the British admiral. Before the enemy could form a regular order of battle, Sir John Jervis, by carrying a press of sail, came up with them, passed through their fleet, then tacked, and thus cut off nine of their ships from the main body. These ships now attempted to form on the larboard tack, either with a design of passing through the British line, or of running to leeward of it, and thus rejoining their friends. But only one of them succeeded, because, being covered with smoke, her intention was not discovered till she had reached the rear; the others were so warmly received that they put about, took to flight, and did not appear again in the action till

¹ Nelson urged the admiral to pursue the enemy, and follow up his advantage to the utmost; but the latter replied, "We must be contented; we have done very well." The captain of the *Agamemnon* did not understand such timid reasoning. "Had we taken ten sail," said he, "and allowed the eleventh to escape when it had been possible to have got at her, I could never have called it well done." He adds, that, if his advice had been followed, they would have had such a day as the annals of England never produced.

Nelson. its close. The admiral being now at liberty to direct his attention to the enemy's main body, still superior in number to his whole fleet, made signal to tack in succession. Nelson, whose station was in the rear of the British line, perceiving that the Spaniards were bearing up before the wind, with an intention of forming line and joining their separated ships, or of avoiding an engagement, disobeyed the signal without a moment's hesitation, and ordered his ship to be wore. This at once brought him into action with seven of the enemy's ships, four of which were first-rates. But he was nobly supported by Troubridge in the Culloden; and the Blenheim also came to his assistance. The Salvador del Mundo and San Isidro dropped astern, and were fired into with tremendous effect by the Excellent, Captain Collingwood, to whom the latter struck. At this moment the Captain was closely engaged with three first-rates, the San Nicolas, an eighty-gun ship, and a seventy-four; the Blenheim was ahead, and the Culloden, crippled, had drifted astern. Disdaining the parade of taking possession of beaten enemies, Collingwood immediately ranged up, passed within ten feet of the San Nicolas, giving her a tremendous broadside, and then pushed on for the Santissima Trinidad of 136 guns. The San Nicolas having luffed up, the San Joseph fell on board of her, and Nelson resumed his station abreast of them, and close alongside. The Captain being now incapable of further service, either in the line or in chase, Nelson directed the helm to be put a-starboard, and calling the boarders, ordered them to board. The San Nicolas was carried after a short struggle, and the San Joseph boarded from the San Nicolas, Nelson himself leading the way, and exclaiming, "Westminster Abbey or victory." This was the work of an instant; but before Nelson could reach the quarter-deck of the Spanish ship, an officer looked over the rail, and said they surrendered. This daring achievement was effected with comparatively small loss, and Nelson himself received only a few bruises. The Captain, however, had suffered severely in the action. She had lost her fore-top-mast; not a sail, shroud, nor rope was left; her wheel had been shot away; and a fourth part of the loss sustained by the whole squadron had fallen upon that single ship.

The Spaniards had still eighteen or nineteen ships which had suffered little or no injury; that part of the fleet which had been separated from the main body in the morning was now coming up; and Sir John Jervis made the signal to bring to. The enemy, however, did not venture to renew the combat; and, as soon as the action was discontinued, Nelson went on board the admiral's ship. Sir John Jervis received him with open arms, and said he could not sufficiently thank him. For this victory the commander-in-chief was rewarded with a peerage and the title of Earl St Vincent; whilst Nelson, who, before the action was known in England, had been advanced to the rank of rear-admiral, received the insignia of the Bath, and a gold medal from his sovereign.

In April 1797, Sir Horatio Nelson, having hoisted his flag as rear-admiral of the blue, was sent to bring away the troops from Porto Ferrajo; and having performed this service, he shifted his flag to the Theseus, a ship which had taken part in the mutiny in England. Whilst in the Theseus, he was employed in the command of the inner squa-

dron at the blockade of Cadiz. During this service, his personal courage was eminently signalized. In a night attack upon the Spanish gun-boats (3d of July 1797), his barge was assailed by an armed launch, carrying twenty-six men, whilst he had with him only the usual complement of ten men and the cockswain, besides Captain Freemantle. After a severe conflict, hand to hand, eighteen of the enemy were killed, all the rest wounded, and the launch taken. Twelve days after this rencontre, Nelson sailed at the head of an expedition against Teneriffe. It having been ascertained that a homeward-bound Manilla ship had recently put into Santa Cruz, the expedition was undertaken in the hope of capturing this rich prize. But it was not fitted out upon the scale which Nelson had proposed; no troops were embarked; and although the attack was made with great intrepidity, the attempt failed. The boats of the squadron being manned, a landing was effected early in the night, and Santa Cruz taken and occupied for about seven hours; but the assailants, finding it impracticable to storm the citadel, were obliged to prepare for retreat, which they effected without molestation, agreeably to stipulations which had been made with the Spanish governor by Captain Troubridge, whose firmness and presence of mind were conspicuously displayed on this occasion. The total loss of the English in killed, wounded, and drowned, amounted to 250. Nelson himself was amongst the wounded, having, in stepping out of the boat to land, received a shot through the right elbow, which shattered the whole arm, and rendered amputation necessary.

Nelson was now obliged to return to England, where honours awaited him sufficient to cheer his mind amidst the sufferings occasioned by the loss of his arm. Letters were addressed to him by the first lord of the admiralty and the Duke of Clarence; the freedom of the cities of London and Bristol was transmitted to him; he was invested with the order of the Bath; and he also received a pension of £1000 a year.¹ His sufferings from the lost limb, however, were long and painful. A nerve had been taken up in one of the ligatures at the time of the operation, and besides, the ligature was of silk instead of waxed thread; a circumstance which produced a constant irritation and discharge, until at length, after three months of continual pain, it came away about the end of November. From that time the arm began to heal, and, as soon as he found his health re-established, he sent to a neighbouring church a form of devout thanksgiving to Almighty God for his recovery from a severe wound.

In April 1798, he hoisted his flag on board the Vanguard, and was ordered to rejoin Earl St Vincent. Immediately on his arrival, he was despatched to the Mediterranean with a small squadron, to ascertain, if possible, the object of the great expedition which was then fitting out at Toulon. He sailed from Gibraltar on the 9th of May, with three seventy-fours, four frigates, and a sloop of war. On the 19th the squadron reached the Gulf of Lyons, and on the 22d a violent storm inflicted serious injury on the Vanguard; the main-top-mast went over the side, the mizen-top-mast soon afterwards gave way, the fore-mast went in three pieces, and the boltsprit was found to be sprung in as many places. Captain Ball in the Alexander now took the disabled ship in tow in order

¹ The memorial which, as a matter of course, he was called upon to present on this occasion, exhibited an extraordinary catalogue of services performed during the war. It stated, that he had been in four actions with the fleets of the enemy, and in three actions with frigates, in six engagements against batteries, in ten actions in boats employed in cutting vessels out of harbour or in destroying them, and in taking three towns; that he had served on shore with the army four months, and commanded the batteries at the sieges of Bastia and Calvi; that he had assisted at the capture of seven sail of the line, six frigates, four corvettes, and eleven privateers of different sizes; that he had taken and destroyed nearly fifty sail of merchant-vessels, and had actually been engaged against the enemy upwards of one hundred and twenty times; in which services he had lost his right eye and right arm, and had been severely wounded and bruised in his body. This memorial, which is dated "October 1797," and addressed "to the king's most excellent majesty," is perhaps without a parallel in our naval history; yet what splendid additions were afterwards made by him to the catalogue of his services!

Nelson. to carry her into the harbour of St Pietro, in Sardinia. Nelson, apprehensive that the attempt might endanger both vessels, ordered him to cast her off; but that excellent officer replied that he was confident he could save the Vanguard, and, by God's help, he would do it. Previously to this there had been a coolness between Sir Horatio and Captain Ball; but from this time the former became fully sensible of the great merit of the latter, and a sincere friendship subsisted between them during the remainder of their lives. By extraordinary exertions the Vanguard was refitted in four days; the supply of water was also completed; and he received a reinforcement of ten ships of the line and one of fifty guns, which Lord St Vincent had sent to him under the command of Commodore Troubridge. That officer took with him to Nelson no instructions as to the course he was to steer, nor any certain account of the enemy's destination. Every thing was left to his own judgment. But, unfortunately, the frigates having been separated from him in the tempest, had not yet been able to rejoin; and he was obliged to sail without them. The first news of the enemy's armament was that it had surprised Malta. Nelson now formed a plan for attacking it whilst at anchor at Gozo; but on the 22d of June he received information that the French had left the island on the 16th, the day after their arrival. Thinking it clear that their destination was eastward, he accordingly made all sail for Egypt, and arrived off Alexandria on the 28th; but the enemy were not there, neither could any account of them be obtained. He then shaped his course to the northward for Caramania, and steered along the southern side of Candia, carrying a press of sail night and day, with a contrary wind. The want of the frigates was now severely felt; they were the eyes of the fleet, and if they had not been separated, he could scarcely have failed to gain information of the enemy. Baffled in the pursuit, however, he returned to Sicily, took in what stores he required at Syracuse, and on the 25th of July sailed for the Morea. The period of uncertainty was now approaching its term. On the 28th the squadron made the Gulf of Coron, and Troubridge having entered the port, returned with the intelligence that the French had been seen about a month before steering to the south-east from Candia. On receiving this information, Nelson determined to return immediately to Alexandria; and, accordingly, the British fleet, with every sail set, stood once more for the coast of Egypt. On the 1st of August they came in sight of Alexandria; and, at four in the afternoon, Captain Hood, in the Zealous, made the signal for the French fleet. For several days previous to this the admiral had scarcely taken either food or sleep. He now ordered his dinner to be served, whilst preparations were making for battle; and when his officers rose from table to repair to their several stations, he said to them, "Before this time to-morrow I shall have gained a peerage, or Westminster Abbey."

The French fleet had arrived at Alexandria on the 1st of July; and the admiral, Brueys, not being able to enter the port, which time and neglect had ruined, moored his ships in Aboukir Bay, in a strong and compact line of battle; the headmost vessel being close to a shoal on the north-west, and the rest of the fleet forming a kind of curve along the line of deep water, so as not to be turned by any means on the south-west. The advantage of numbers, both in ships, guns, and men, was in favour of the French. They had thirteen ships of the line and four frigates, carrying 1196 guns, and 11,230 men. The English had the same number of ships of the line, and one fifty-gun ship, carrying 1012 guns and 8068 men. The English ships were all seventy-fours; the French had three eighty-gun ships, and one three-decker of 120 guns. But any disparity of force on the part of the latter was more than com-

pensated by their having such a commander as Nelson. Nelson. That gallant chief has not left any detailed account of his plan of attack: but it was well understood by the squadron, and has been accurately described by several who assisted in carrying it into execution. It had been his practice, during the pursuit, to have his captains on board the Vanguard, whenever circumstances would permit, and to explain to them his own ideas as to the best modes of attack, and the plans which he proposed to execute on falling in with the enemy, whatever their situation might be. His officers were thus well acquainted with the principles of his tactics; and such was his confidence in their abilities, that the only thing determined on, in case they should find the French at anchor, was that the ships should form in the manner most convenient for mutual support, and then anchor by the stern. But the moment he perceived the position of the enemy, the thought instantly struck him that where there was room for a French ship to swing, there would also be room for one of his to anchor. He, therefore, resolved to keep entirely on the outer side of the French line, and to station his ships, as far as he was able, one on the outer bow, and another on the outer quarter, of each of the enemy's, thus doubling on a certain portion of their line. When he had fully explained his plan of attack, Captain Berry, perceiving the scope of the design, exclaimed with transport, "If we succeed, what will the world say?" "There is no *if* in the case," replied the admiral; "that we shall succeed is certain; but who may live to tell the story is a different question."

The battle commenced at half-past six o'clock, a little before sunset. Captain Foley led the way in the Goliath, out-sailing the Zealous, Captain Hood, which for some minutes disputed with him the post of honour. As the squadron advanced, the enemy opened a steady fire from the starboard side of their line, into the bows of the leading British ships. It was received in silence, whilst the men on board of each ship were employed aloft in furling the sails, and below in tending the braces and making ready for anchoring; a proceeding which told the enemy that escape was impossible. Foley, in the Goliath, intending to fix himself upon the inner bow of the Guerrier, kept as near the edge of the bank as the water would admit; but his anchor hung, and having opened his fire, he drifted to the second ship, the Conquerant, before it was clear, then anchored by the stern, inside of her, and in ten minutes shot away her masts. Hood, in the Zealous, took the station which the Goliath intended to have occupied, and, in twelve minutes, totally disabled the Guerrier. The Orion, Sir James Saumarez, was the next ship which doubled on the enemy's van. Passing to windward of the Zealous, she opened her larboard guns as long as they bore on the Guerrier, then passing inside the Goliath, sunk a frigate, hauled round, and anchoring between the fifth and sixth ships from the Guerrier, took her station on the larboard bow of the Franklin, and the quarter of the Peuple Souverain, receiving and returning the fire of both. The Audacious, Captain Gould, pouring heavy broadsides into the Guerrier and Conquerant, fixed herself on the larboard bow of the latter; and when that ship struck, passed on to the Peuple Souverain. The Theseus, Captain Millar, followed, and having brought down the remaining masts of the Guerrier, anchored inside the Spartiate, the third ship in the French line. Whilst these advanced ships thus doubled on the enemy's line, the Vanguard was the first which anchored on the outer side, within half pistol-shot of the Spartiate. Nelson veered half a cable, and instantly opened a tremendous fire, under cover of which the four other ships of his division sailed ahead of the admiral. In a few minutes every man stationed at the first six guns in the fore part of the Vanguard was either killed or wounded; and these guns were three times cleared. The Mino-

Nelson. taur, Captain Louis, anchored next ahead, and took off the fire of the Aquilon, the enemy's fourth ship. The Bellerophon, Captain Darby, passed ahead, and dropped her stern anchor on the starboard bow of the Orient, Bruey's own ship, of 120 guns. Captain Peyton, in the Defence, now took his station ahead of the Minotaur, and engaged the Franklin, the enemy's sixth ship, by which judicious movement the British line remained unbroken. The Majestic, Captain Westcott, got entangled with the main rigging of a French ship astern of the Orient, and suffered severely from the fire of that three-decker; but she at length swung clear, and closely engaged the Heureux, the ninth ship, on the starboard bow, receiving also the fire of the Tonnant, the eighth in the French line.

The four remaining ships of the British squadron, having been detached previously to the discovery of the French fleet, were at a considerable distance when the battle commenced. Troubridge, in the Culloden, the foremost of these ships, was two leagues astern. He came on sounding, as the others had done; but as he advanced the increasing darkness augmented the difficulty of the navigation, and, in rounding the reef, his ship suddenly grounded, and, notwithstanding the greatest exertions, could not be got off in time to bear a part in the action. The Culloden, however, served as a beacon to the Alexander and Swiftsure, which entered the bay, and took their stations amidst the darkness, which was relieved only by the flashes of light from the contending fleets. The Swiftsure, Captain Hallowell, occupied the position from which the Bellerophon, overpowered by the huge Orient, had drifted almost a complete wreck, opening a steady fire on the quarter of the Franklin and the bows of the French flag-ship; and at the same instant the Alexander, Captain Ball, passed under his stern, and anchored within-side, on the larboard quarter of the Orient, raking that ill-fated ship, and keeping up a severe fire of musketry upon her decks. Lastly, the Leander, Captain Thomson, finding that the Culloden could not be got off, advanced with the intention of anchoring athwart hawse of the Orient; but the Franklin being near ahead, there was not room for him to pass clear of the two, and he took his station athwart hawse of that ship, in a position which enabled him to rake both.

The first two ships of the French line had been dismantled within a quarter of an hour after the commencement of the action; and the others had suffered so severely that victory was already certain. At half-past eight o'clock, the third, fourth, and fifth were taken possession of. In the mean time Nelson had received a severe wound on the head from a langridge shot, which cut a large flap of skin from the forehead, and occasioned such an effusion of blood that the injury was at first believed to be mortal. But when the surgeon came to examine the wound, he found that the hurt was merely superficial, and requested that the admiral would remain quiet. Nelson, however, could not rest, and having called for his secretary, had begun to dictate his despatches, when suddenly a cry was heard upon deck that the Orient was on fire. In the confusion, he found his way up unassisted and unnoticed, and having appeared on the quarter-deck, immediately gave orders that boats should be sent to the relief of the enemy. It was about ten minutes after nine o'clock when the fire broke out in the Orient. Brueys was dead. He had received three wounds, yet would not leave his post; and when a fourth cut him almost in two, he desired to be left to die upon deck. In the meanwhile the flames soon mastered the devoted ship, and by the light of the conflagration, the situation of both fleets could be perceived, their colours being clearly distinguishable. About ten o'clock the ship blew up with a tremendous explosion, which was followed by a pause not less awful. The firing immediately ceased; and the first sound which broke the silence was the dash of

her shattered masts and yards falling into the water from the vast height to which they had been projected by the explosion. The combat recommenced with the ships to leeward of the centre, and continued till about three in the morning. At day-break on the 2d, the Guillaume Tell and the Généreux were the only ships of the French line which had their colours flying. Not having been engaged, they cut their cables in the forenoon, and stood out to sea, accompanied by two frigates. The Zealous pursued; but as there was no other ship in a condition to support her, she was recalled. Of thirteen sail of the line, nine were taken, and two burnt (the Timoleon having shared the fate of the Orient); and of four frigates, one was burnt and another sunk. In short, it was a conquest rather than a victory. The French fleet had been annihilated; and if the English admiral had been provided with small craft, nothing could have prevented the destruction of the store-ships and transports in the harbour of Alexandria.

Nelson was now at the very summit of glory. Congratulations, rewards, and honours were showered upon him by all the foreign states and powers to which his victory promised a respite from French aggression. In his own country, he was created Baron Nelson of the Nile and of Burnham-Thorpe, with a pension of L.2000 a year for his own life and those of his two immediate successors; a degree of rank which, though it might be the measure of ministerial gratitude, was by no means commensurate with the services for which it was bestowed on him. A grant of L.10,000 was voted to Nelson by the East India Company; the Turkish Company presented him with a piece of plate; and the city of London bestowed honorary swords on the admiral and on each of his captains. In the distribution of rewards, he was particularly anxious that the captain and first lieutenant of the Culloden should not be passed over because of their misfortune. "It was Troubridge," said he, in addressing the admiralty, "who equipped the squadron so soon at Syracuse; it was Troubridge who exerted himself for me, after the action; it was Troubridge who saved the Culloden, when none that I know in the service would have attempted it." As the ship had not been engaged, however, it was thought necessary to make an exception as to the captain; but Nelson was desired to promote the lieutenant upon the first vacancy that should occur.

Having made the necessary arrangements in regard to the prizes, and left a squadron before Alexandria, Nelson stood out to sea on the seventeenth day after the battle, and early on the 22d of September appeared in sight of Naples, where the Culloden and Alexander had preceded him, and given notice of his approach. Here he was received with every demonstration of joy and triumph, both by the royal family and the people, and formed that unfortunate connection with Lady Hamilton which exercised so baneful an influence on the rest of his life. The state of Naples at this period was deplorable. The king, like the rest of his race, was passionately fond of field-sports, and cared for almost nothing else. The queen had all the vices of the house of Austria, with little to mitigate and nothing to ennoble them. The people were sunk in ignorance, and debased by misgovernment; at once turbulent and cowardly, ferocious and indolent, irreligious and fanatical. Nelson was fully sensible of the depravity and weakness of all by whom he was surrounded; yet, seduced by the blandishments of the queen, the flatteries of the court, and the pernicious influence which Lady Hamilton now began to exercise over his mind, he suffered himself to be implicated in transactions which compromised the honour of his country, and deeply tarnished his hitherto unsullied fame. The defeat of Mack at Castellana, and the advance of the French towards Naples, were followed by the flight of the royal

Nelson.

Nelson. family, who were conveyed by Nelson to Palermo. After this an armistice was signed (10th of January 1799), by which the greater part of the kingdom was given up to the enemy; and this cession necessarily led to the loss of the whole. Naples was occupied by the French under Championnet, and the short-lived Parthenopean republic soon afterwards established. But the successes of the allies in Italy speedily changed the face of affairs, and prepared the way for the restoration of the exiled monarch.

Relying on the diminished numbers of the enemy, whose force had been greatly reduced, the royalists took the field, and Cardinal Ruffo appeared at the head of an armed rabble, which he called the Christian army. Captain Foote, in the Seahorse, with some Neapolitan frigates, and a few smaller vessels, was ordered to co-operate with this force, and to give it all the assistance in his power. Ruffo, advancing without any plan, but ready to take advantage of any accident which might occur, now approached Naples. Fort St Elmo, which commands the city, was garrisoned by French troops; but the castles of Uovo and Nuovo, commanding the anchorage, were chiefly defended by the Neapolitan "patriots," the leading men amongst them having taken shelter there. As the possession of these castles would greatly facilitate the reduction of Fort St Elmo, Ruffo proposed to the garrison to capitulate, on condition that their persons and property should be respected, and that they should, at their own option, either be sent to Toulon or remain at Naples, without being molested in their persons. These terms were accepted, and the capitulation was signed by the cardinal, the Russian and Turkish commanders, and also by Captain Foote as commanding the British force. But Nelson, who soon afterwards arrived in the bay with a large fleet, made a signal to annul the treaty, declaring that he would grant to rebels no other terms than those of unconditional submission; and, notwithstanding the strenuous opposition of the cardinal, who protested that a treaty solemnly concluded could not be honourably set aside, the garrisons of the castles were delivered over as rebels to the vengeance of the Sicilian court. The tragedy which followed formed an appropriate sequel to this disgraceful and infamous transaction. The aged Prince Caraccioli, a man of high character and great personal merit, was accused of having joined the enemy, and, after a sham trial by a court-martial of Neapolitan officers assembled on board the British flag-ship, found guilty, and sentenced to death; and this sentence Lord Nelson ordered to be carried into execution the same evening, on board of the Sicilian frigate *La Minerva*. He was arrested at nine in the morning, put on his trial at ten, condemned at twelve, and hanged at the fore-yard-arm of the frigate at five o'clock in the afternoon, after which his body was cut down and thrown into the sea.¹ If any thing could deepen the indignation and abhorrence which these foul deeds are calculated to excite in every honourable and virtuous mind, it would be the circumstance that Nelson accepted from the Sicilian court a reward for services which leave such an indelible stain on his memory. In addition to a sword splendidly enriched with diamonds, he received the dukedom of Bronte, a title

which seems to have greatly flattered his vanity, with a domain worth about L.3000 a year. Nelson.

After the appointment of Lord Keith to the chief command of the fleet in the Mediterranean, Nelson made preparations for his return to England; and, as a ship could not be spared to convey him thither, he travelled through Germany to Hamburg, in company with Sir William and Lady Hamilton, and having embarked at Cuxhaven, landed at Yarmouth on the 6th of November 1800, after an absence of three years from his native country. He was welcomed in England with every mark of popular respect and admiration; in the towns through which he passed the people came out to meet him, and in London he was feasted by the city, drawn by the populace, thanked for his victory by the common council, and presented with a gold-hilted sword studded with diamonds. He had now every earthly blessing except domestic happiness, which, in consequence of his infatuated attachment to Lady Hamilton, he had forfeited for ever. Before he had been three months in England he separated from Lady Nelson, at the same time calling God to witness that there was nothing in her or in her conduct which he could wish otherwise. His best friends remonstrated against this causeless and cruel desertion; but their expostulations produced no other effect than to make him displeased with them, and dissatisfied with himself.

The three northern courts of Denmark, Sweden, and Russia, had now formed a confederacy for the purpose of setting limits to the naval pretensions of Great Britain; and as such a combination, under the influence of France, would soon have become formidable, the British cabinet instantly prepared to crush it. With this view a formidable fleet was fitted out for the North Seas, and the chief command of it given to Sir Hyde Parker; under whom Nelson, who had recently been made vice-admiral of the blue, consented to serve as second in command. The fleet sailed from Yarmouth on the 12th of March 1801; and on the 30th of the same month, Lord Nelson, having shifted his flag from the *St George* to the *Elephant*, led the way through the Sound, which was passed without any loss. The Danes, upon whom the storm was now about to burst, were well prepared for defence. Upwards of two hundred pieces of cannon were mounted on the Crown batteries at the entrance of the harbour, and a line of twenty-five two-deckers, frigates, and floating batteries, was moored across its mouth. Besides, the navigation was little known, and extremely intricate; all the buoys had been removed; and the channel was considered as impracticable for so large a fleet. It was apparent, therefore, that the Danes could not be attacked without great difficulty and risk; and in a council of war, held on board of the flag-ship, considerable diversity of opinion prevailed. Nelson, however, cut short the discussion, by offering his services for the attack, requiring only ten sail of the line, and the whole of the smaller craft. Sir Hyde Parker assented, but gave him two more line-of-battle ships than he had asked, and left every thing to his own judgment. On the morning of the 1st of April, the whole fleet moved to an anchorage within two leagues of the town; and, about one o'clock, Nelson hav-

¹ After receiving sentence, Caraccioli requested Lieutenant Parkinson, in whose custody he was, to intercede with Lord Nelson for a new trial. He complained that he had not been allowed time to prove his defence, which was, that he had acted under compulsion; and, in particular, that Count Thurn, who presided at the court-martial, was notoriously his personal enemy. To this Lord Nelson answered, that the prince had been fairly tried by the officers of his own country, and that he could not interfere. But he forgot, that if he felt himself warranted in ordering the trial and the execution, no human being could ever have questioned the propriety of his interfering on the side of mercy. Caraccioli then earnestly entreated that he might be shot, declaring that the disgrace of being hanged was dreadful to him. Even to this supplication Lord Nelson lent a deaf ear, and told the lieutenant to go and attend to his duty. As a last hope, Caraccioli thought of an application to Lady Hamilton; and Lieutenant Parkinson went to seek her. She was not to be seen on this occasion; but she was present at the execution. *Quis talia fando temperet a lacrymis?* Whilst horror thrills through our veins at the conduct of those parties, it is impossible to contemplate without emotion the fate of the aged patriot who was thus cruelly sacrificed.

Nelson. ing completed his last examination of the ground, made the signal to weigh, which was received with a shout throughout the whole division destined for the attack. They weighed with a light and favourable wind, the small craft pointing out the course to be followed; and the whole division, having coasted along the shoal called the Middle Ground, doubled its farther extremity, and anchored there just as the darkness closed, the signal to prepare for action having been made early in the evening. As his anchor dropped, Nelson exclaimed, "I will fight them the moment I have a fair wind."

On the following morning, at half past nine, the signal was made for the ships to weigh in succession; at ten minutes after ten the action commenced, at the distance of about half a cable length from the enemy; and by half-past eleven the battle became general. The plan of attack had been complete; but seldom had any project of the kind been disconcerted by more untoward accidents. The *Agamemnon* was immoveably aground, at a distance which rendered her entirely useless; the *Bellona* and the *Russell* had also grounded in a situation where they could not render half the service that was required of them; of the squadron of gun-brigs, only one could get into action, owing to the baffling currents; and only two bomb-vessels could reach their station on the Middle Ground, where they were to open their fire on the arsenal. Nelson's agitation was extreme when he found himself, before the action began, deprived of a fourth part of his force; but no sooner was he in action than the wild music of the fight seemed to drive away all anxious thoughts; his countenance brightened, and his conversation became joyous, animated, and delightful. At one o'clock the enemy's fire continued unslackened; and the commander-in-chief, despairing of success, made the signal for discontinuing the action. At this moment, whilst Nelson was pacing the quarter-deck in all the excitement of battle, a shot passing through the main-mast, knocked the splinters about. "It is warm work," said he, "and this day may be the last to any of us at a moment; but, mark you," he added, "I would not be elsewhere for thousands." The signal-lieutenant now called out that the signal for discontinuing the action had been thrown out by the commander-in-chief. Nelson continued to walk the deck, and appeared not to notice it. At the next turn, the lieutenant asked if he should repeat the signal. "No," replied Nelson; "acknowledge it." He then called to know if the signal for close action was still hoisted; and being answered in the affirmative, said, "Mind you keep it so." A little after, "I have a right to be blind sometimes, Foley," added he, addressing the captain; then putting the glass to his blind eye, in a mood of sportive bitterness, which gives an inexpressible interest to the scene, "I really do not see the signal," he exclaimed; and, after a pause, "Keep mine for closer battle flying; that's the way I answer such signals; nail mine to the mast."

Between one and two o'clock, however, the fire of the Danes slackened; and about two it ceased along the greater part of their line, and some of their lighter ships were adrift. But it was difficult to take possession of those which had struck, because the batteries on Amak Island protected them, and an irregular fire was still kept up from the ships themselves, the crews being continually reinforced from the shore. By half-past two, however, the action had ceased, except with the Crown batteries, and one or two ships which had renewed their fire, though with but little effect. At this critical moment, Nelson, with a presence of mind peculiar to himself, and never more signally displayed than now, availed himself of the circumstance to secure the advantage he had gained, and to open a negotiation. He retired into the stern gallery, and wrote to the Crown Prince thus: "Vice-Admiral Lord Nelson has been commanded to spare Denmark, when she no longer resists.

VOL. XVI.

The line of defence which covered her shores has struck to the British flag; but if the firing is continued on the part of Denmark, he must set on fire all the prizes he has taken, without having the power of saving the men who have so nobly defended them. The brave Danes are the brothers, and should never be the enemies, of the English." This, after an interchange of communications, led to an interview between Nelson and the Crown Prince, at which the preliminaries of negotiations were adjusted; and a treaty was at length concluded, by which the northern confederacy was dissolved, and the maritime superiority of Britain unequivocally recognised. For the battle of Copenhagen, Nelson was raised to the rank of Viscount, and, on the recall of Sir Hyde Parker, appointed to the chief command in the North Sea.

Having settled affairs in the Baltic, Lord Nelson returned in a frigate to England. But he had not been many weeks ashore when he was called upon to undertake a service which might have been equally well executed by a much inferior man. This was an attack on the flotilla which had been prepared at Boulogne for the threatened invasion of England. A force had been got together, with an alacrity that has seldom been equalled; and the attack was made by the boats of the squadron, in five divisions; but the enemy were fully prepared, and, though nothing could exceed the gallantry with which they were assailed, the enterprise proved unsuccessful. Owing to the darkness, the state of the tide, and the uncertainty attending all night attacks, the divisions had separated; and the great effort was not made with that unity which alone can insure success. In his letters to the admiralty, Nelson affirmed, that if our force had arrived as he intended, all the chains and the moorings with which the enemy's flotilla were secured could not have prevented our brave seamen from bringing off the whole of them. Every thing that prudence could suggest had been done; no error had been committed; and never did Englishmen display greater courage. But he now desired to be relieved from this boat-service, thinking it an unsuitable employment for a vice-admiral; and his wishes were speedily gratified by the signature of the preliminaries of peace.

He had purchased a house and an estate at Merton in Surrey, meaning to pass there the remainder of his days, in the society of Sir William and Lady Hamilton. But the happiness which he had promised himself was not of long continuance. Sir William Hamilton died early in 1803. A few weeks subsequent to this event the war was renewed; and the day after his majesty's message to parliament announcing the re-commencement of hostilities, Lord Nelson departed to assume the command of the fleet in the Mediterranean.

On the 20th of May 1803, he hoisted his flag on board the *Victory*, and having taken his station immediately off Toulon, he there waited with incessant watchfulness for the coming out of the enemy. This blockade proved one of the longest and most persevering that have been recorded in our naval annals; yet notwithstanding all his vigilance, the Toulon fleet put to sea on the 18th of January 1805, and shortly afterwards formed a junction with the Spanish squadron at Cadiz, Sir John Orde, who commanded off that port, having retired at their approach. Nelson had formed his own judgment of their destination, when Donald Campbell, then an admiral in the Portuguese service, went on board of the *Victory*, and communicated his certain knowledge that the combined French and Spanish fleets were bound for the West Indies. The enemy had five and thirty days start; but Nelson calculated that he should gain eight or ten days by his exertions. To the West Indies therefore he bent all sail, and on the 4th of June reached Barbadoes, whither he had sent despatches before him. Deceived by false intelligence, he then stood to the southward in quest

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Nelson. of the enemy; but advices having met him by the way, that the combined fleets were at Martinique, he immediately sailed for that island, where he arrived on the 9th, and received certain intelligence that they had passed to the leeward of Antigua the preceding day, and taken a homeward-bound convoy. It was now clear that the enemy, having accomplished the object of their cruise, were flying back to Europe; and accordingly, on the 13th, he steered for Europe in pursuit of them. On the 17th July he came in sight of Cape St Vincent, and directed his course towards Gibraltar, where he soon afterwards anchored, and went on shore for the first time since the 16th of June 1803. The combined fleet having thus eluded his pursuit, he returned almost inconsolable to England, to reinforce the Channel fleet with his squadron, lest the enemy should bear down upon Brest with their whole collected force.

Having landed at Portsmouth, Lord Nelson at length received news of the enemy's fleet. After an inconclusive action, in which they had run the gauntlet through Sir Robert Calder's squadron on the 22d of July, about sixty leagues west of Cape Finisterre, they had proceeded to Ferrol, brought out the squadron which there awaited their arrival, and with it entered Cadiz in safety. Upon receiving this intelligence, Nelson again offered his services, which were willingly accepted; and Lord Barham, then at the head of the admiralty, gave him a list of the navy, desiring him to choose his own officers. No appointment could be more in unison with the feelings and judgment of the nation. The *Victory*, destined once more to bear his flag, was refitted with incredible despatch; and such was his impatience to be at the scene of action, that although the wind proved adverse, he worked down the Channel, and, after a rough passage, arrived off Cadiz on the 29th of September, the day on which the French admiral, Villeneuve, had received peremptory orders to put to sea the very first opportunity. Fearing that the enemy, if they knew his force, might be deterred from venturing to sea, he kept out of sight of land; desired Collingwood to hoist no colours, and fire no salute; and wrote to Gibraltar to request that the force of the fleet might not be inserted in the gazette published there. The station which he chose was some fifty or sixty miles to the westward of Cadiz, off Cape St Mary's. At this distance, he hoped to induce the enemy to come out, whilst he guarded against the danger of being caught by a westerly wind near Cadiz, and driven within the Straits. In the meanwhile the blockade of the port was rigorously enforced; and a line of frigates communicated between him and the squadron of eight or nine sail left before Cadiz, so as to give him the earliest intelligence of the enemy's movements. The advantage of this plan was, that he could receive supplies and reinforcements without the enemy being informed of it; whilst, by preventing the entrance of neutral vessels into Cadiz, the combined fleets were deprived of both. Accident also contributed to mislead Villeneuve, by inducing him to doubt whether Nelson himself had actually assumed the command. An American, lately arrived from England, assured him it was impossible this could be the case, for he had seen the English admiral only a few days before in London, and at that time there was no rumour of his going again to sea.

On the 9th of October, Lord Nelson communicated to Admiral Collingwood his plan of attack. The order of

sailing was to be the order of battle; the fleet formed in two lines, with an advanced squadron of the fastest-sailing two-deckers. The second in command, having the entire direction of his line, was to break through the enemy's line about the twelfth ship from their rear; he himself was to lead through the centre; and the advanced squadron were to cut off three or four ahead of the centre. This plan was adapted to the strength of the enemy, and had for its object to render the two lines, and the squadron ahead, one-fourth superior in force to those they cut off. His object he declared to be, close and decisive action. "In case signals cannot be seen or clearly understood," said he, "no captain can do wrong if he place his ship alongside that of an enemy." This was what he called the *Nelson-touch*. It was a mode of attack equally new and simple. Every one comprehended it in a moment, and was convinced that it would succeed. In fact, it proved irresistible.

Villeneuve, relying upon the information he had received, put to sea on the 19th, and at day-break on the 21st of October the combined fleets were distinctly seen from the deck of the *Victory*, formed in a close line ahead, about twelve miles to the leeward, and standing to the southward, off Cape Trafalgar. The British fleet consisted of twenty-seven sail of the line, and four frigates; the enemy's fleet, of thirty-three sail of the line, and seven frigates. But their superiority was greater in size and in weight of metal than in numbers; they had 4000 troops on board; and the best riflemen who could be procured, many of them Tyrolese, were dispersed throughout the ships. Soon after day-light Nelson came on deck, and the signal was made to bear down on the enemy in two lines, upon which the fleet set all sail; Collingwood, in the *Royal Sovereign*, leading the lee line of thirteen ships, and Nelson, in the *Victory*, leading the weather line of fourteen. Having seen that all was right, he retired to his cabin, and wrote a devout prayer, in which, after beseeching the Almighty to grant a great and glorious victory, he committed his life to the God of Battles; and in another writing which he annexed in the same diary, he bequeathed Lady Hamilton as a legacy to his king and country, and commended to the public beneficence his adopted daughter, Horatia, desiring that in future she would use the name of Nelson only. Blackwood went on board the *Victory* about six, and found him in good spirits, but very calm, and with none of that exhilaration which he had displayed on entering into battle at Aboukir and at Copenhagen. With a prophetic anticipation, he seems to have looked for death with almost as certain a conviction as for victory. His whole attention was fixed upon the enemy, who now formed their line on the larboard tack; thus bringing the shoals of Trafalgar and St Pedro under the lee of the British, and keeping the port of Cadiz open for themselves. This was most judiciously done; and Nelson, aware of the advantages it gave them, made signal to prepare to anchor. But Villeneuve, though a skilful seaman, did not profit by this manœuvre, nor attempt to evade the combat. His plan of defence was as well conceived, and as original, as that of the attack. He had formed his fleet in a double line, every alternate ship being about a cable's length to windward of her second ahead and astern, and offered battle in the most handsome manner, being apparently determined to risk a fair trial of strength.¹ On the other hand, Nelson, being certain of a triumphant issue to

Nelson.

¹ Of the advantages or disadvantages of the mode of attack adopted by the British fleet, it may be considered as presumptuous to speak, since the event proved so completely successful; but as the necessity of any particular experiment frequently depends upon contingent circumstances, not originally calculated on, there can be no impropriety in questioning whether the same plan would succeed in all circumstances, and on all occasions. The original plan of attack was suggested on the supposition that the enemy's fleet consisted of forty-six sail of the line, and the British of forty; it was intended to be made from the windward; and on the supposition that the hostile fleet would be in a line ahead, the British fleet was to be brought within gun-shot of the enemy's centre, in two divisions of sixteen sail each, with a division of observation consisting of the remaining eight ships. The lee division was to make an attack under all possible sail on the twelve rear ships of the enemy; it was to break through the enemy's line, and such ships as might be thrown

Nelson. the day, declared to Captain Blackwood that he would not be satisfied with less than twenty of the enemy's ships. Then appeared that signal, Nelson's last signal, which will be remembered as long as the language or even the memory of England shall endure: "England expects every man to do his duty." It was received throughout the fleet with a responsive burst of acclamation, rendered sublime by the spirit which it breathed, and the determination it expressed. "Now," said Nelson, "I can do no more. We must trust to the great disposer of all events, and the justice of our cause. I thank God for this great opportunity of doing my duty."

On this memorable day, Nelson wore, as usual, his admiral's frock coat, bearing upon the left breast the various orders with which he had at different times been invested. Decorations which rendered him so conspicuous a mark to the enemy were beheld with ominous apprehension by his officers; especially as it was known that there were riflemen on board the French ships, and it could not be doubted that his life would be particularly aimed at. This was a point, however, on which it was hopeless to reason or remonstrate with him. "In honour I gained them," said he, when allusion was made to the insignia he wore, "and in honour I will die with them." Nevertheless, Captain Blackwood, and his own captain, Hardy, having represented to him how advantageous it would be to the fleet were he to keep out of action as long as possible, he consented that the *Temeraire* and the *Leviathan*, which were sailing abreast of the *Victory*, should be ordered to pass ahead. But the order was unavailing; for these ships could not pass ahead if the *Victory* continued to carry all her sail; yet, so far from shortening sail, Nelson took an evident pleasure in pressing on, and rendering it impossible for them to obey his own order. As the enemy showed no colours till late in the action, the *Santissima Trinidad* was distinguishable only by her four decks; and to the bow of his old opponent in the action off Cape St Vincent he ordered the *Victory* to be steered. In the mean time, an incessant raking fire was kept up on the *Victory*; and as the ship approached, Nelson remarked, "This is too warm work to last long." She had not yet returned a single gun, though by this time fifty of her

men had been killed or wounded, and her main-top-mast with all her studding-sails and booms shot away. A few minutes after twelve, however, she opened her fire from both sides of her deck, and soon afterwards ran on board the *Redoubtable*, just as her tiller ropes were shot away. Captain Harvey, in the *Temeraire*, fell on board the *Redoubtable* on the other side; and another enemy's ship, the *Fougueux*, fell on board the *Temeraire*; so that these four ships formed as compact a tier as if they had been moored together, their heads lying all the same way. The lieutenants of the *Victory* now depressed their guns, and fired with a diminished charge, lest the shot should pass through and injure the *Temeraire*; and as there was danger that the *Redoubtable* might take fire from the lower-deck guns, the muzzles of which, when run out, touched her sides, the fireman of each gun stood ready with a bucket of water, which, as soon as the gun had been discharged, he dashed into the hole made by the shot. In this situation, the *Victory* kept up an incessant fire from both sides, directing her larboard guns on the *Bucentaur* and *Santissima Trinidad*.

But Nelson's hour was now come. It had been part of his prayer that the British fleet might be as distinguished for humanity in victory as for bravery in battle. Setting an example himself, he twice gave orders to cease firing upon the *Redoubtable*, supposing she had struck, because her great guns were silent; for as she carried no flag, it was impossible instantly to ascertain the fact. From the ship which he had thus twice spared he received his death-wound. In the heat of the action, about a quarter after one o'clock, a musket-ball from the mizen-top of the *Redoubtable* struck the epaulette on his left shoulder; and he fell upon his face on the spot covered with the blood of his secretary, Mr Scott, who had been killed a short time before. "They have done for me at last, Hardy," said he, as a serjeant of marines and two seamen raised him from the deck. "I hope not," replied Captain Hardy. "Yes," he rejoined; "my back bone is shot through." But, though mortally wounded, he did not for a moment lose that presence of mind for which he was ever distinguished. As they were carrying him down the ladder to the cockpit, he observed that the tiller ropes, which had been shot

out of their stations were to assist those of their friends who should be hard pressed. The remainder of the enemy's fleet were to be left to the management of the commander-in-chief.

Now, if this plan had been adhered to, the English fleet would have borne up together, and sailed in two lines abreast in their respective divisions, until they came up with the enemy; the plan which consideration had matured would have been executed; the victory would have been more speedily decided; and the brunt of the action would have been more equally felt. An attack made in two great divisions, with a squadron of observation, seems to combine every necessary precaution, under all circumstances. The power of bringing an overwhelming force against a particular point of an enemy's fleet, so as to insure the capture of the ships attacked, and afterwards concentrating such a force as may be sufficient not only to protect the attacking ships from any offensive attempt which may be made against them by the unoccupied vessels of the enemy, but also to secure the prizes already made, will most probably lead to victory, perhaps to the annihilation of the greater part, if not the whole, of the fleet thus attacked.

The mode of attack adopted with such success at Trafalgar had, however, few or none of these advantages. The attacking force was brought forward so leisurely and successively, that an enemy of equal spirit, and equal ability in seamanship and gunnery, would have destroyed the ships in detail one after another, carried on, as they were, slowly by a heavy swell and by light airs. This may easily be demonstrated. Besides, whilst the fleet was advancing to the attack on the 21st of October, the weather was exactly such as might have produced this result, seeing that when the battle began the sternmost ships of the British were still six or seven miles distant. By the mode of attacking in detail, and the manner in which the combined fleet was drawn up to receive it, the British, instead of doubling on the enemy, were themselves doubled and tripled on, and the advantage of applying an overwhelming force collectively was thus totally lost. The *Victory*, *Temeraire*, *Belleisle*, *Mars*, *Colossus*, and *Bellerophon*, were placed in such situations at the onset, that nothing but the most heroic gallantry and great practical skill at the guns could have extricated them. If the enemy's vessels had closed up from van to rear, as they ought to have done, and if their crews had possessed a nearer equality in active courage, it may be doubted whether even British skill and gallantry would have availed; the position of the combined fleet being precisely that in which the British were desirous of being placed, namely, having part of the opposing fleet doubled on, and separated from the main body. The attack, however, succeeded, in spite of all these disadvantages; first, from the enthusiasm inspired throughout the fleet by having Nelson to command them; secondly, from the gallant conduct of the leaders of the two grand divisions; thirdly, from the individual exertions of each ship after the attack commenced, and the superior practice of the guns; fourthly, from the consternation spread throughout the combined fleet on finding the British so much stronger than had been expected; fifthly, from the rapid destruction which followed the attack of the two leaders, and which was witnessed by both fleets; and, lastly, from the loss of the French admiral's ship early in the action. Nelson knew his means, and the power he had to deal with; he also knew that the means he adopted were sufficient for the occasion. But as the mode of attack executed at Trafalgar might be followed under different circumstances, and have a different result, it is right to state both its merits and defects; nor can this detract, in any degree, from the fame of Nelson, whose whole professional career was marked throughout by genius and originality, allied with heroic daring and judicious enterprise.

Nelson.

away early in the action, were not yet replaced, and ordered that new ones should be immediately rove. He was laid upon a pallet in the midshipman's berth, and, the surgeon being called, it was soon perceived that the wound he had received would speedily prove mortal; but this was concealed from all except Captain Hardy, the chaplain, and the medical attendants. Being certain, however, from the sensation which he felt in his back, and the gush of blood within his breast, that no human aid could avail him, he insisted that the surgeon should leave him, and attend to those to whom he might be useful. "You can do nothing for me," said he. Suffering from intense thirst, and in great pain, he expressed much anxiety as to the fate of the action; and his countenance brightened with a gleam of joy as often as the hurra of the crew of the Victory announced that an enemy's ship had struck.

At length he became very impatient to see Captain Hardy, whom he repeatedly sent for; but that officer could not leave the deck, and upwards of an hour elapsed before he could quit his station. When they met, they shook hands in silence, Hardy struggling to suppress his emotions. "Well, Hardy," said Nelson, "how goes the day with us?" "Very well," replied the captain; "ten ships have struck, but five of the enemy's van have tacked, and show an intention of bearing down on the Victory. I have called two or three of our fresh ships round, and have no doubt of giving them a drubbing." "I hope," said Nelson, "none of our ships have struck." "There is no fear of that," answered Hardy; upon which the dying hero said, "I am a dead man; I am going fast; it will soon be all over with me; my back is shot through." Hardy, unable any longer to suppress his feelings, hastened upon deck; but, in some fifty minutes, returned, and taking the hand of his dying commander, congratulated him on having gained a complete victory. He did not know how many of the enemy had struck, as it was impossible to perceive them distinctly; but fourteen or fifteen at least had surrendered. "That's well," answered Nelson; "but I had bargained for twenty." Then, in a stronger voice, he said, "Anchor, Hardy, anchor;" and again, most earnestly, "Do you anchor." Next to his country, Lady Hamilton occupied his thoughts. "Take care of my dear Lady Hamilton, Hardy; take care of poor Lady Hamilton;" and, a few minutes before he expired, he said to the chaplain, "Remember that I leave Lady Hamilton and my daughter Horatia as a legacy to my country." The last words he was heard to utter distinctly were, "I thank God, I have done my duty." He expired at half-past four o'clock, three hours and a quarter after he had received his fatal wound.

The total loss of the British in the battle of Trafalgar amounted to 1587. Twenty of the enemy struck, and, of the ships which escaped, four were afterwards taken by Sir Richard Strahan. But unhappily the fleet did not anchor, as Lord Nelson with his dying breath had enjoined; a heavy gale came on from the south-west; some of the prizes went down, some were driven on the shore, one effected its escape into Cadiz, others were destroyed, and four only were, by the greatest exertions, saved. Still, by this mighty achievement, the navies of France and Spain received a blow from which they have not yet recovered; the gigantic combinations of Napoleon, with a view to a descent upon England, were completely baffled; and the success of his campaign of Austerlitz was not only compensated, but in a great measure neutralised. It is needless to add, that all the honours which a grateful country could bestow were heaped on the memory of the man who had achieved this unequalled victory.

In Lord Nelson's professional character were united all the highest qualities of a great commander; wonderful foresight, prompt judgment, never-failing presence of

mind, ardent zeal, unbounded confidence in the resources of his own mind, and that intuitive decision in the midst of difficulty and peril, which, after all, is the distinguishing attribute of great military or naval genius. His daring was without rashness, and his enterprise based upon the most skilful calculation; his ardour never outrun his understanding, nor his love of glory a due consideration of the material and moral means by which alone success can be obtained. His talents for command were of the highest order, and he knew the invaluable secret of inspiring other men with confidence in him, as well as with confidence in themselves. But the best character which can be drawn of him is the history of his achievements, all stamped with the impression of his genius; and, that nothing might be wanting to the consummation of his renown, he departed in a bright blaze of glory, leaving to his country a name which is her pride and boast, and an example which will continue to be her shield and her strength. (See Southey's *Life of Nelson*, in two vols. 12mo; *Life* by Clarke and M'Arthur, 8vo; Ekins' *Naval History*, 4to; and James's *Naval History*, 6 vols. 8vo.) (A.)

NEMEA, in *Ancient Geography*, a place situated between Cleonæ and Philus, in Argolis; but whether town, district, or something else, is uncertain. There stood a grove, in which the Argives celebrated the Nemean games; and there happened all the fabulous circumstances of the Nemean lion.

NEMEAN GAMES, so called from Nemea, a place situated between the cities of Cleonæ and Philus, where they were celebrated every third year. The exercises consisted of chariot-races, and all parts of the pentathlon. These games were instituted in memory of Opheltus or Archemorus, the son of Euphetes and Creusa, nursed by Hypsipyle, who, leaving him in a meadow whilst she went to show the besiegers of Thebes a fountain, found him dead on her return, and a serpent twined about his neck; and hence the fountain, before called *Langia*, was named *Archemorus*, and these games were instituted to comfort Hypsipyle. Some, however, ascribe their institution to Hercules, after his victory over the Nemean lion; whilst others think that they were instituted first in honour of Archemorus, but intermitted, and afterwards revived again by Hercules. The victors were crowned with parsley, an herb used at funerals, and fabled to have sprung from Archemorus's blood. The Argives presided at these games.

NEMESIANUS, AURELIUS OLYMPIUS, a Latin poet who was born at Carthage, and flourished about the year 281 of our era, under the Emperor Carus, and his sons Carinus and Numerian, the last of whom was so fond of poetry that he contested the glory with Nemesianus, who had written a poem upon fishing and maritime affairs. We have still remaining a poem of this author called *Cynegeticon*, and four eclogues, which were published by Paulus Manutius in 1538, by Barthelet in 1613, and at Leyden in 1653, with the notes of Janus Vlitias. Giraldi has preserved a fragment of Nemesianus, which was communicated to him by Sannazarius, to whom we are indebted for this poet's works, which, having been found written in Gothic characters, he caused to be converted into the Roman, and then sent to Paulus Manutius. Although this poem has acquired some reputation, it is greatly inferior to those of Oppian and Gratian upon the same subject; yet the style of Nemesianus is natural enough, and has even some degree of elegance. The world was so much possessed with an opinion of his poem in the eighth century, that it was read amongst the classics in the public schools; particularly in the time of Charlemagne, as appears from a letter of the celebrated Hincmar, bishop of Rheims, to his nephew Hincmar of Laon.

NEMESIS, in pagan worship, the daughter of Jupiter and Necessity, or, according to others, of Oceanus and

Nemea
||
Nemesis.

Nemesius
||
Neomenia.

Nox, and who had the care of revenging the crimes which human justice left unpunished. She was also called Adrastæa, because Adrastus king of Argos was the first who raised to her an altar; and Rhamnusia, from her having a magnificent temple at Rhamnus in Attica. She had likewise a temple in the Capitol at Rome. Nemesis is represented with a stern countenance, holding a whip in one hand and a pair of scales in the other.

NEMESIUS, a Greek philosopher who embraced Christianity, and was made bishop of Emesa, in Phœnicia, his birthplace. He flourished in the beginning of the fifth century. There is a work of his extant, entitled *De Natura Hominis*, in which he refutes the fatality of the Stoics, as well as the errors of the Manicheans, the Apolinarists, and the Eunomians; but he espouses the opinion of Origen concerning the pre-existence of souls. This treatise was translated by Valla, and printed in the year 1535. Another version of it was afterwards made by Ellebodus, and printed in 1665; it is also inserted in the *Bibliotheca Patrum*, in Greek and in Latin. Lastly, an edition was published at Oxford in 1671, folio, with a learned preface, in which the editor endeavours to prove, from a passage in this book, that the circulation of the blood was known to Nemesius; an opinion, however, which has since been shown to be a mistake. (See Freind's *History of Physic*.)

NEMOURS, a town of France, in the department of the Seine and Marne, being situated on the river Loing, eleven miles south from Fontainebleau. It was erected into a duchy in the fourteenth century, and has been in the house of Orleans since the time of Louis XIV. It has a considerable trade in corn, wine, and other articles. The population in 1836 amounted to 3839. Long. 2. 41. E. Lat. 48. 15. N.

NENAGH, a market-town of Ireland, in the county of Tipperary and province of Munster, ninety-five miles south-west from Dublin. It is situated upon the Nenagh River, a little to the southward of its union with the Shannon, before it reaches Lough Derg. The town enjoys a good general country trade, but has no manufactures properly so called. Here are the ruins of an ancient castle, called Nenagh Round; also those of an hospital founded in the year 1200, for canons following the rule of St Augustin. There are four fairs held here in the course of the year. The population of the town amounts to 6335.

NENIA, or NÆNIA, in ancient Latin poetry, a kind of funeral song sung to the music of flutes at the obsequies of the dead. Authors represent the nœnia as sorry compositions, sung by hired female mourners, called *præficae*. The first rise of these nœnia are ascribed to the physicians. In the heathen antiquity, the goddess of tears and funerals was called *Nenia*, whom some suppose to have given that name to the funeral song, and others to have taken her name from it.

NEOMENIA, or NOUMENIA, a festival of the ancient Greeks, celebrated at the beginning of every lunar month. As the name imports, it was observed upon the day of the new moon, in honour of all the gods, but especially Apollo, who was called *Neomenios*, because the sun is the fountain of light; and whatever distinction of times and seasons may be made on account of other planets, yet they are all owing to him as the original of those borrowed rays by which they shine. The games and public entertainments at these festivals were provided by the rich, to whose tables the poor flocked in great numbers. The Athenians at these times offered solemn prayers and sacrifices for the prosperity of their country during the ensuing month.

The Jews had also their neomenia, or feast of the new moon, on which peculiar sacrifices were appointed; on this day also they had a sort of family entertainment and rejoicing. But the most celebrated neomenia was that at the beginning of the civil year, or first day of the month Tisri, on which no servile labour was performed; and the

people then offered particular burnt sacrifices, sounding the trumpets of the temple. The modern Jews keep the neomenia only as a feast of devotion, which any one may observe or not as he pleases.

NEOPHYTES, or new plants, a name given by the ancient Christians to those heathens who had newly embraced the faith, such persons being considered as regenerated, or born anew by baptism. The term *neophytes* has also been used for new priests, or those just admitted into orders; and sometimes for the novices in monasteries or convents. It is still applied to the converts made by the missionaries amongst the infidels.

NEOTS, ST, a market-town of the county of Huntingdon, in the hundred of Toesland, fifty-six miles from London. It stands on the navigable river Ouse, over which there is a fine stone bridge. It is a well-built place, with a large market-place, and has a handsome church, with an elegant and lofty spire. It has a good market, which is held on Thursday. The population amounted in 1801 to 1752, in 1811 to 1998, in 1821 to 2272, and in 1831 to 2617.

NEOTS, ST, a town of the county of Cornwall, in the hundred of West, distant 226 miles from London. It is said to have been built by a relation of King Alfred, who died here in 899, and was buried at the place of the same name in Huntingdonshire. The population amounted in 1801 to 906, in 1811 to 1041, in 1821 to 1255, and in 1831 to 1424.

NEPAUL, an extensive country of Hindustan, long and narrow in its form, and, although somewhat curtailed in its dimensions by the progress of British conquest, still one of the largest and most compact independent kingdoms in the country. To the north it is bounded by the great mountain wall of the Himalayas, which separates it from Thibet; to the south the Nepaul territory reaches about twenty miles beyond the base of the mountains, into the plains, being bounded by the provinces of Delhi, Oude, Bahar, and Bengal, with the exception of about sixty miles of territory belonging to the nabob of Oude, which intervene; to the east the river Mitchee separates Nepaul from the British territories; and thence it is bounded by the principality of Sikkim, which extends to the Chinese frontier. Previously to the late war with Britain, the conquests of the Ghoorkhas or Nepaulese extended to the banks of the Sutlege, the eastern river of the Punjab; but the boundary is now the river Cali, or the western branch of the Goggra, which separates the Ghoorkha territory from the British province of Kumaon. The above limits, however, include a territory much larger than that to which the peculiar name of Nepaul Proper belongs, and made up of conquests gained by the Ghoorkhas within the last sixty years from a variety of petty hill states. This extended dominion is mostly included between the twenty-seventh and thirty-first degrees of north latitude, and in extreme length may be estimated at 460 miles, by 115 miles in breadth. The following are the modern districts into which this territory is divided:

- | | |
|---------------------------------------|----------------|
| 1. Nepaul Proper. | 6. Khatang. |
| 2. Country of the twenty-four rajahs. | 7. Chayenpoor. |
| 3. Country of the twenty-two rajahs. | 8. Saptari. |
| 4. Muckwanpoor. | 9. Morung. |
| 5. Kirauts. | |

Nepaul comprehends the greater part, probably about two thirds, of Northern Hindustan. It is accordingly extremely diversified in its surface, the mountains which form its northern boundary rising to the level of perpetual snow. These high mountains generally decline into lower hills, from which they are separated by fine valleys, which are still considerably above the level of the plains, and the lowest belt of the Nepaul dominions forms part of the great plain of Hindustan. Immediately to the north of this flat country there is a region of nearly the same width, consisting of small hills, which rise gra-

Neophytes
||
Nepaul.

Aspect of
the coun-
try.

Nepaul.

dually towards the north, and are watered by many streams from the loftier mountains to which these hills gradually unite. The hills are covered with forests: on the lower hills are found the saul forests, which, with the pines, are not surpassed in any country, either for straightness or size, as well as for strength and durability. Higher up there is a variety of other trees, and amongst the northern hills many pines, and an abundance of mimosa, from which the catechu or Indian rubber is made; also oaks, walnut and chestnut trees, hornbeam, Weymouth pine, and common spruce, for the most part of but very little value, owing to the inaccessible nature of the country. The breadth of this mountainous belt immediately north and east of Catmandoo is estimated at from thirty to forty miles. This is a very elevated region, consisting of one mountain heaped upon another rising to a great height, so that in winter their summits are for a short time covered with snow, and it even falls sometimes in the valley below. A hoar frost also very often covers the ground; but although the cold is occasionally for three or four months severe enough to freeze the tanks and pools of standing water, the rivers are never frozen. Between the mountains are narrow valleys of from 3000 to 6000 feet above the plains of Bengal. The height of the valley of Nepaul, measured by the barometer, is about 4000 feet. It is nearly of an oval figure; its greatest extent from north to south is twelve miles, and it stretches east and west nine miles; and though it scarcely lies in a higher latitude than twenty-seven and a half degrees, yet it enjoys nearly the same climate as the southern countries of Europe.

Climate.

Lying near a region buried in snow, its climate must no doubt be somewhat modified by such a vicinity. Still Kirkpatrick mentions, that in summer the thermometer rose once to eighty-seven degrees during his residence in the valley; and its usual height about noon varied from eighty-one to eighty-four degrees. At sun-rise it was commonly between fifty and fifty-four, and at nine in the evening it generally fluctuated from sixty-two to sixty-six degrees. Fifty-one observations, from the 17th to the 25th March, gave an average of sixty-seven degrees. The seasons are nearly the same with those in Upper Hindustan. The rains commence a little earlier, and set in from the south-east quarter; they are generally very violent, and break out towards the middle of October. The mountain-torrents rush down in consequence with great impetuosity, overflowing their banks, and spreading over all the adjacent country. By these violent inundations, the plain is cut into numerous and deep ravines. The temperature varies necessarily with the elevation of the ground; so that by ascending the adjacent mountains, the heat of Bengal may in the course of a few days be exchanged for the cold of Russia.

Produce.

The produce also varies along with the climate. In some parts rattans and bamboos, both of enormous dimensions, are seen, and others produce only oaks and pines. In several parts the pine-apple and sugar-cane ripen, whilst others yield only barley, millet, and similar grains. The mulberry grows luxuriantly all over the hills; and they cut its young and tender shoots annually, whilst full of leaves, and, having dried them, stack them for fodder, which is said to be both nutritious and agreeable to the animals. In this comparatively cold and elevated climate, the periodical rains are not favourable for the ripening of fruits, which everywhere abound, but never come to perfection, the heat of the climate not being sufficient to bring them to maturity before the approach of the rains. Peaches grow wild on every hill; but one side of them is rotted by the damp, whilst the other side is green; and the grapes, which grow without shelter from the rains, are always bad. Kirkpatrick, however, from the spontaneous productions which he saw on the spot, namely, the peach, the raspberry, the walnut, the mulberry, and others, thought that all the fruits and esculent vegetables

of England might with proper attention be successfully raised in the mountainous valleys of Nepaul. In the warmer valleys, the pine-apple is uncommonly fine; as also the orange, which ripens in winter. The abundant rains, if they spoil the fruits, are, however, very favourable to the produce of grain; and wherever the land can be levelled into terraces, however narrow, it is well adapted for transplanted rice, which ripens after the rains have ceased. The least rocky faces of the hills are generally cut into these terraces, which are seen everywhere rising above each other. This operation produces numerous strips of level ground, more or less narrow, according to the steepness of the hills. Great labour and care are bestowed upon this operation, and it is often necessary to build a retaining wall to support the edge of the small strip of ground. Much attention is also paid to the levelling of its surface, to fit it for irrigation, as every rivulet is first conducted by drains to the higher cultivated spots, and then, after saturating them, to the lower range of fields. In some parts the same land gives a winter crop of wheat and barley. Where the land is too steep for terraces, it is generally cultivated after fallow with the hoe, and produces rice sown broadcast, maize, cotton, three kinds of pulse, a kind of mustard, manjeet or Indian madder, wheat, barley, and sugar-cane. Tobacco is an article of general cultivation in these hills, and it is considered as of a fine quality. It is exported in considerable quantities both to the plains and to Bootan. One of the great staples of agriculture in these mountainous countries is a large species of cardamom; and ginger is likewise a valuable production in the country between Nepaul Proper and the Cali, though rice is still the main dependence of the farmer. Various dry rices are cultivated in Nepaul, under the general name of ghya, some of which, so far from needing hot weather to bring them to maturity, are actually raised in situations very much exposed to falls of snow; whilst others do not require, as in Bengal, to be flooded, but flourish in the driest and loftiest spots. There are also amongst the spontaneous productions of this fertile soil several edible roots and herbs, which form a considerable part of the sustenance of the poorer inhabitants. Of these there are a species of yam, and a kind of wild asparagus, as well as various other plants well deserving the attention of travellers. There are also medicinal plants, and a rich variety of dyeing drugs procured from bitter or aromatic woods, which grow naturally in the country, and which are held in great estimation. The jeeva is a very curious plant, from the expressed leaves of which is produced a juice called cherris, which is a potent narcotic, and possesses very valuable qualities, burning with a flame as bright as that of the purest resin. Its leaves are fabricated into a species of hemp, from which the Newars manufacture some coarse linen, and likewise a very strong kind of sackcloth. Though the soil seems well adapted to the growth of kitchen vegetables, yet the inhabitants are either too indolent or unskilful to raise them. The only kitchen vegetables which Colonel Kirkpatrick met with were cabbages and pease of the worst kind. They have the Thibet turnip, but cannot raise it, any more than the potato, without renewing the seed annually. Amongst these mountains are found the nettle, wild wormwood, raspberries, and mulberries; also a curious shrub called khaksi, the leaf of which answers the purpose of emery or sandpaper, giving a fine polish to the harder woods.

The mountain pasture, though not so good as that in the low country, yet supports numerous flocks of sheep, which migrate with the seasons, in winter to the lower valleys, and in summer to the alpine regions, where they feed upon the herbage of those extensive tracts which lie in the neighbourhood of perpetual snow. The sheep in these altitudes are of considerable size, and have fine wool; the larger are the same as in the lower countries, but are not numerous.

Nepaul.

Nepaul. Buffaloes are not reared by the natives, neither are hogs nor goats, though the country is admirably adapted for both. Horses are brought from Thibet, as none are bred south of the Himalaya; also the large ox of Thibet, or the *bos grunniens*, described by Turner, the beautiful tail of which forms one of the exports from Nepaul; and the goat which produces the shawl wool. The kustoora or musk-deer is a native of Lower Thibet, though it is not very abundant anywhere. It is usually caught by means of a snare made of a particular kind of mountain bamboo. It is difficult to obtain the musk pure, even at Catmandoo; and Colonel Kirkpatrick mentions, that it is even usual to adulterate it whilst it is yet in the bag on the body of the animal. In the great forest which skirts the Nepaul territories throughout their whole extent, from Serinagur to the Teesta, wild animals abound. Elephants are found here in great numbers, and are a source of revenue to the Nepaul government. About 200 or 300 of these animals are caught annually; but most of them being very young, and not being above seven feet and a half in height, they are not of great value. They are extremely mischievous, and two or three of them sometimes take possession of the road, and obstruct the progress of travellers for a considerable time. A large herd of them assaulted the camp of the Nepaul deputies when they were on their way to Patna, and were with great difficulty driven away. They sometimes issue from the forest in droves, and overrun the cultivated country on its borders, penetrating sometimes a considerable space within the company's territories. The rhinoceros, the tiger, the leopard, and other ferocious animals, find shelter in the depths of the forests. The animal known in Bengal by the name of the Nepaul dog is brought from Upper and Lower Thibet, of which it is a native. It is a fierce, surly creature, about the size of an English bull-dog, and covered with thick long hair. Several very fine birds are found in these mountainous countries, as the manal (*meleagris satyra*), and the damphya (*phasianus impeyanus*). They are a species of pheasants, the damphya being of the golden, and the manal or moonal of the spotted sort. They are both extremely beautiful birds. The chakoor is well known to the Europeans of India under the name of the fire-eater. It is a species of partridge, and derives its name from its reputed power of swallowing fire. The fact is, that in the breeding season this bird is remarkably fond of red pepper, after eating two or three capsules of which, it will bite at a red coal if presented to it. The khaledge is met with in the thickets which overrun the gorges of the mountains near Noakote. The sarus, wild goose, wild duck, and several others of the feathered species common to Bengal and the rest of the countries to the southward of Nepaul, are occasionally seen in this and the adjacent valleys; where, however, they merely appear as birds of passage, making Nepaul only a stage in their flight from Hindustan to Thibet.

Minerals. The stones and ores collected in the country indicate the existence of a variety of minerals in the mountains of Nepaul, such as iron, lead, copper, &c. It was formerly a prevalent idea amongst the Hindus, from whom it was received by the British, that the country contained mines of gold. The only foundation for this notion appears to be, that in the course of commerce the gold of Thibet passed into Bengal and Bahar through Nepaul; or that a few grains of gold were occasionally collected in the sands of the rivers, or found in the consecrated pebbles of Gunduck; or sometimes that specimens of gold ore have been sent to the governor-general by way of presents or curiosities. Other accounts of gold mines may also be referred to the circumstance of scanty particles of gold being found in the beds of torrents from the mountains. With regard to silver, it is said that some veins of it have been discovered to the westward of Noakote. But Kirkpatrick, in

his account of Nepaul, suspects that it has no better foundation than that silver has lately been found in certain ores which were very rich in lead; whilst others appeared to be a species of galena, well worth the working for the sake of the silver which they contained. Several attempts had been made to extract the silver, but by such an unskilful process, that most part of the baser metal was sacrificed, in consequence of which the return scarcely repaid the expense. The copper is found quite near the surface of the earth, the ore being dug from trenches open above, so that the work is entirely interrupted by the rainy season. Those ores are found in several varieties, and are said to be rich and of an excellent kind. The mine is shared amongst certain families along with the rajah, who, there is every reason to believe, claims the lion's share, and, as in all other parts of Hindustan, leaves the workmen a bare subsistence. Oude was formerly supplied with copper from Nepaul; but of late years it has been superseded by European copper, owing to the difficulties and expense of transferring it to the market through a mountainous country without navigable rivers. The iron ore is also found near the surface, and is not surpassed in excellence by that of any other country. Sulphur is likewise abundant, and procured in great quantities. There is no good authority for believing that either the ores of antimony or mercury are found in the territories of Nepaul; but the western parts abound in arsenic and pyrites, though these sulphureous ores are no longer worked, on account of the deleterious effects occasioned by the operation. Stone is found in abundance and variety, particularly jasper and marble; but the houses are universally built of brick, because the use of stone, though abounding everywhere, is prevented by the expense of carriage in a country where the roads do not admit of wheel-carriages, and where there is no navigation. There is said to be a considerable mass of rock crystal near Ghorkha, and limestone as well as slate abounds everywhere; yet there are no limekilns in the country, the only cement employed being mud, which, the natives pretend, answers better in their humid climate than mortar.

The alpine region belonging to Nepaul is about the same Moun- breadth of thirty or forty miles from north to south. Scat- tained peaks are here seen covered with perpetual snow, until, in advancing to the boundaries of Thibet, everlasting winter reigns. This inhospitable region consists chiefly of immense rocks rising into sharp peaks and tremendous precipices, covered with snow, and almost constantly involved in clouds. Some of these mountains are estimated to rise 19,960 feet above the valley of Nepaul. The rains here are periodical, as in the plains of Hindustan, and fall in the hottest season of the year. The snowy ridge of the Himalaya Mountains, though it has a winding course, has few interruptions, and is in most places impassable. Several rivers which take their rise in Thibet make their way through the mountainous ridges, but by such narrow chasms, and amidst such enormous precipices, that these openings afford no practicable communication between the mountains and the plains. In the mountain passes no sort of baggage or merchandise is transportable, except on the shoulders of hill porters. The price of this carriage is regulated by the government.

The numerous valleys which are interspersed through- out the mountains of Nepaul are inhabited by a variety of Popula- mixed races. The aboriginal inhabitants appear, from their tion. physiognomy, to have been of Tartar or of Chinese origin, and to have had no resemblance to the Hindus either in features, religion, or manners. Before their arrival they had no idea of caste. The period when these mountainous regions were first invaded by the Hindus is uncertain; but, according to the most authentic traditions, it is supposed to have taken place about the fourteenth century. The Hindus who now inhabit these mountains were about this

Nepaul. period driven from their country by the invasion of the Mahomedan sovereign of Delhi, who made proposals to marry a daughter of the rajah of Chitore, celebrated for her beauty. This offer was refused, and the consequence was that his city was captured and destroyed; and, to avoid the hated yoke of the conqueror, great numbers of the inhabitants fled to the mountains. Many of the chiefs amongst the mountain tribes, accordingly, claim descent from these Chitore princes, although on doubtful grounds. There are a few rajpoots whose claims to a pure descent from the Chitore family are allowed; and the families of the mountain chiefs who have adopted the Hindu rules of purity, and some even who have neglected this, are now admitted to be rajpoots; whilst, on the other hand, the purity of the Chitore blood has been so often contaminated by alliances with the Tartar and Chinese races, that several of the Chitore family have acquired the Tartar countenance, and some of the mountain tribes, by intermarriages with pure rajpoots in a low station, have acquired the oval faces and high noses of that remarkable race. The original purity of the rajpoot blood having been thus lost by indiscriminate alliances, all the hill chiefs, whether their descent from the Chitore family be real or pretended, are now called rajpoots, and hold the principal offices, civil and military, of the petty states in which the country was subdivided, until Nepaul was subdued by the reigning family of the Ghoorkhas. In the eastern parts of the country the aboriginal tribes still remain; and, until the predominance of the Ghoorkhas, they enjoyed unmolested their customs and religion. But west of the Cali the case is different, almost all the inhabitants claiming a descent from the Hindu colony. They accordingly consist principally of the two superior classes of Hindus, or brahmins and chetrees, with their various subdivisions.

East of the Cali the tribes which possessed the country were chiefly, 1. Magars, who occupied the lower hills in the western parts, and were very soon converted to the brahmin doctrine of abstaining from beef. They are at present enlisted by the Ghoorkha sovereigns, and compose a great majority of their troops. 2. The Gurungs, a pastoral tribe, shift their abode between the mountains and the valleys with the summer and the winter. They still adhere to the lama priesthood and the Buddhist religion. They cultivate with the hoe, are diligent miners and traders, and employ the numerous flocks which they possess in conveying their goods to market. 3. The Jariyas form a numerous tribe, and inhabit the lower hilly region between the Cali and the Nepaul valley, and are now nearly all converted to the brahminical doctrines. 4. The Newars are an industrious people, following agriculture and commerce, and are more advanced in the mechanical arts than the mountain tribes. The greater part of them adhere to the tenets of the Buddhists: though they have adopted the distinctions of caste, they do not acknowledge the lamas, and have a priesthood of their own. The more fertile part of what is called Nepaul Proper was chiefly occupied by the Newars, a race addicted to agriculture and commerce, and far more advanced in the arts than any other of the mountain tribes. Their style of building, and most of their arts, appear to have been introduced from Thibet. All the Newars burn their dead; they eat buffaloes, sheep, goats, fowls, and ducks, and are addicted to the immoderate use of spirituous liquors. They live in towns or villages, in houses built of brick cemented with clay, and covered with tiles; these houses are three stories high, the ground-floor being allotted to the cattle and poultry, the second to the servants, and the third to the family of the owner. Their rooms are low, and have a mean and dirty appearance, and, besides, are infested with vermin, which, in addition to the filth, the offals of the shambles, and the blood of their sacrifices collected in the streets, give their towns an exceedingly offensive aspect

Nepaul. to Europeans. The Newar women are never confined to the house. At the early age of eight years they are carried to a temple, and married, with the usual ceremonies of the Hindus, to a fruit called *ull*; and when they arrive at puberty they are betrothed to a man of the same caste, and the parents give a dower to the husband, or rather her paramour, their manners being extremely licentious. Like the women amongst the Nairs, they may in fact have as many husbands as they choose, being at liberty to divorce them as often as they please, and upon the slightest pretences. The Newars are peaceable, industrious, and even ingenious; much attached to the superstition which they profess, and now reconciled to the chains imposed on them by their Ghoorkha conquerors. Their occupations are chiefly those of agriculture; and they are, besides, almost exclusively employed in the arts and manufactures of the country. They are generally of the middle size, possessed of great corporeal strength, with broad shoulders and chest, very stout limbs, round and rather flat faces, small eyes, low and somewhat spreading noses, and open and cheerful countenances, with little or no resemblance, according to Kirkpatrick, to the Chinese countenance. The complexion of the women is somewhat between a sallow and a copper colour. 5. The Dhenwars and Mhanjees are the husbandmen and fishers of the western districts. 6. The Bhootias. Though some families of this race are planted in the lower lands, they occupy, generally speaking, such parts of the mountainous country as are included in the Nepaul territories. They shave their heads, and observe many idolatrous rites and customs. 7. The Bhanras are a sort of separatists from the Newars, and are supposed to amount to 5000. They observe many of the customs of the Bhootias. To the eastward some districts of the Nepaul dominions are inhabited by tribes, such as the Limboos, Nuggerkootees, and others, of whom little more is known than the names.

With regard to the number of inhabitants within the bounds of Nepaul, we have no data to form any thing like an accurate estimate. The wild and rugged nature of the country gives no ground to suppose that the population is considerable. It is in the valleys that the population is collected; and these, says Kirkpatrick, with the exception of Nepaul and two or three others, are little better than mountainous cavities. Even the Terriani, or low belt of land which runs along the southern frontier, is but indifferently peopled, the villages being, according to the traveller already mentioned, very thinly scattered, and mean both in their appearance and in their size. The Nepalese themselves give the most exaggerated account of their numbers. They reckon their population by houses; and to Patan, their largest town, they assign 24,000 houses, to Bhatgong 22,000, and to Catmandoo 18,000. This would give a population of 640,000. There are, besides, many large villages and towns scattered around Kirtee-poor, containing 12,000 houses; Theamee, Buneba, Pharping, Punonlee, Dhulkill, Chappagang, all containing from 6000 to 7000 houses; and, besides these, there are reckoned between twenty and thirty smaller, of from 1000 to 4000 houses, all within the valley of Nepaul. But this gives a population that sets probability at defiance, and is considered, both by Frazer and Kirkpatrick, as a glaring fallacy. A loose estimate of the latter traveller lowers the population of Nepaul to half a million of souls.

The lands are held by various tenures. Those consti-State of tuting crown-lands, or the rajah's immediate estates, are property chiefly situated in the Ghoorkha territory, though there is hardly any portion of the Ghoorkha conquests in which the prince has not appropriated land to his own use. Some of these lands are cultivated by husbandmen, who receive a share of the produce; others are tilled by the neighbouring husbandmen, who are obliged to dedicate a certain

Nepaul. number of days in the year to this service. From such lands the rajah draws all the supplies necessary for the support of his household. The brahmins also possess lands, the title to which they receive by royal investiture. These lands are rent free, saleable, and hereditary; but they may nevertheless be alienated for certain crimes. Their proprietors are bound to the reigning prince for nothing beyond his prayers, though they sometimes consider it as prudent to conciliate him by more substantial gifts. Another tenure by which land is possessed by the Newars, is the payment of a considerable fine when the original titles are confirmed, which must be renewed on the accession of each prince. Other lands pay a rent to the crown, or to the jaghiredar (proprietor), in proportion to their produce. The khyra and barilands are those which are destitute of springs or running water, and which, requiring considerable labour, yield, after all, no very profitable return. These pay a rent according to their produce, which is estimated by the number of spades or ploughs employed. Widows may cultivate as much of this land as they can, without paying any rent at all. The kaith or plantation-lands, which are well supplied with water, and, being situated in the valleys, are fruitful, and yield all the superior kinds of grain, pay the half of their produce to the cultivator, who in return defrays all the charges of tillage, with the exception of the seed. These lands are reckoned to yield from twenty to thirty fold; and they pay different rates to the proprietor, according to the value of their produce.

Military
force.

The whole population of Nepaul are liable to military service in times of public danger, though they are not regularly trained to arms. But there is a standing army dispersed over the country, besides a large force always in the capital, amounting to 30,000 or 35,000 troops. These troops are regularly trained, disciplined, and officered after the manner of European troops; and they likewise affect the European exercise, dress, and arms. The regular force of Nepaul has so long been accustomed to active service and to constant victory, that they have acquired all the qualities of veteran soldiers, a fearlessness of danger, and a contempt of any foe opposed to them. "They have," says Frazer, "much of the true and high spirit of a soldier, that setting of life at nought in comparison of the performance of duty, and that high sense of honour which forms his most attractive ornament, and raises his character to the highest." These qualities were frequently displayed in the course of the campaign with the British, against whose overwhelming attacks fortresses were defended with a determined bravery, and a patient endurance of famine and misery, that were truly exemplary. And when they at length surrendered a fort which was no longer tenable, they deplored their hard fate, called themselves wretched men that ought rather to have died, and refused to return to their native country; whilst the courtesy they showed to the British, and the reciprocal good offices received and returned, resembled more the generous spirit of European warfare, than the cruel practices of the East. The expenses of the military establishment are mostly defrayed by assignments of land, though in some instances the soldier receives his pay from the treasury, and occasionally from the public granary; others are paid partly in money, and partly in land; but the most usual mode, and the one most agreeable to the troops, is by putting them in possession of tracts of land, on which they generally settle their families, whom they can maintain better in this manner than by any pecuniary stipend. There seems no fixed rate of reward for different ranks, a good deal depending on the interest of the parties, and other incidental circumstances. One of the captains of the rajah's company of guards informed Colonel Kirkpatrick, that the lands which he held yielded him 180 rupees a year, and that he received an additional sum in money of 280 rupees; but added, that he was

better off when he belonged to a private company. It may be added, that government evinces great consideration for its military and public servants, being particularly indulgent to their widows, orphans, and other destitute branches of their families. The soldiers are in general stout, thick, and well-built men. They are very brave, and prefer close fighting, giving an onset with a loud shout. During the war with the British they attacked with great valour and impetuosity, advancing to the very muzzles of the cannon. They understand the use of the sabre; and each man wears, besides, a "cookree," or long crooked heavy knife, which may be used in war, but is also of great use in all common operations where a knife or hatchet is required. The soldiers also carry a long sort of matchlocks or muskets. The officers, besides the sword and shield and "cookree," carry bows and arrows, which they use very dexterously. The sword which they use has the edge curved inwards like a reaping hook, but far more straight, and very heavy, particularly at the point, where it is very broad, and ends abruptly square. A few small guns are used; but they are confined to the walls of forts, and never carried into the field.

The government of Nepaul is essentially a despotism, Government. and is good or bad according to the character or temporary views of the reigning prince. It is no doubt slightly ameliorated by the authority of immemorial customs, and the influence of religion, which no prince, however despotic, can safely disregard; as well as by the occasional opposition of the aristocracy or chiefs. But the great body of the people derive little benefit from the struggle for power between the prince and his nobles. They seem to possess no civil rights, and are at the mercy of their rulers for whatever treatment the latter think proper to give them. It was observed by Kirkpatrick, in the course of his journey into the country, that the carriers were pressed, without ceremony, into the service of government, and compelled to work without any promise of pay; and in the war with the British, a detachment of troops, because they yielded a post to the enemy which they could no longer hold, were punished with extraordinary cruelty, being mutilated in their faces in the most shocking manner. In Europe the progress of improvement has modified the rigour of the most absolute governments; but in Nepaul, as in all the Asiatic states, despotism grows up to the most frightful maturity in the congenial soil of ignorance; and although the arbitrary will of the prince may be opposed by the force of circumstances, yet there is no permanent security for life and property, such as is derived from the authority of fixed laws. The administration of public affairs is carried on by various officers. The first of these is the choutra or prime minister to the rajah, to whom he is invariably akin. His business is to receive and examine all written and verbal communications regarding public business, and to act as a sort of comptroller-general over the inferior departments of administration. He holds his office during the pleasure of the prince, to whom he submits all his reports on matters of state; and the former, if he see proper, refers them for further investigation to a court of inspection appointed for the purpose. He is paid by a commission or fine on every rice plantation, with the exception of those of the Thurgars or nobles and the military. Secondly, the kajeas are four commissaries who superintend all civil and military affairs, and are employed in the collection of the revenue, and in the management of the Jaghire lands. They are paid by a tax of one rupee on all taxable lands. Thirdly, the sirdars command the armies of the state, and likewise participate in the management of civil business. Fourthly, the kurdars act as secretaries, preparing all communications from the rajah to foreign powers, or to the officers of state. Fifthly, the kupendar and the kuzanchees have the charge, the one of the

Nepaul. rajah's private wardrobe, jewels, and kitchen; and the other of the public wardrobe, from which honorary dresses are issued. All these officers are paid by a moderate duty upon all taxable lands. Sixthly, the ticksali or superintendent of the mint is paid by a commission on the import duties from Thibet, and on a tax payable by all natives of Nepaul who return to their country from Lehassa, Diggercheh, or other parts of Thibet. This tax is exacted with a good deal of rigour. Seventhly, the dhurmaudhikar is the chief criminal judge, who commissions all the inferior judges, excepting those who officiate in the farmed districts. The fees in this department are very great; and as most crimes are punishable by fine, the penalties constitute a large source of emolument, which does not by any means favour the pure administration of justice. Civil questions regarding property are decided by another tribunal, the members of which are usually brahmins. Over this court the criminal judge sometimes presides. Intricate questions are occasionally referred to a superstitious ordeal, in which chance decides; and this barbarous process is a sure index to the manners of the people, and to the low state of their civil institutions. There is, besides, a superintendent of the police, a minister who is employed in complimentary embassies to foreign powers, or in carrying orders to public officers. The soubahs are governors of districts, or farmers, and government collectors, acting as officers of revenue, of justice, and of police; and the omrahs are commanders of military posts.

Revenue. The public revenue is derived from land-rents, customs, fines of various sorts, and from mines. Annual presents are made by the soubahs, and by every one who approaches the court; and a sort of arbitrary income-tax is besides levied from all ranks, even the sacred order, who possess free lands, not being exempted. An officer is often employed for the express purpose of collecting this tax, which is rated according to the exigencies of the state, and which mounts up in many districts to more than the regular revenue. According to Colonel Kirkpatrick, who visited the country in 1792, and who derived his information from good authority, the revenue actually remitted to Catmandoo never exceeded thirty lacs of rupees (L.35,000), but it sometimes fell to twenty-five lacs. The subsequent conquests by the Ghoorkha sovereigns were not productive of a great increase of income; and the reduction of territory by the late war would of course occasion a corresponding diminution. The export duties, and the profits on the sale of elephants, bring in from three to four lacs of revenue. The import duties levied on the trade from Thibet, included under the mint, as the returns consist chiefly in silver bullion, amount to about seven or eight lacs. The duties on salt, the profits on saltpetre, which appears to be a monopoly, on copper and iron mines, and the produce of the land-tax, may be estimated at from fifteen to eighteen lacs. Formerly the inhabitants of Thibet were supplied with a silver currency from the mint of Nepaul, on which the treasury gained a profit of a lac of rupees.

Trade. The trade of Nepaul is by no means so extensive as it might be if it were conducted under proper regulations; being shackled by monopolies for the benefit of government, or of a few favoured merchants, who labour to preserve their privileges by the most invidious and corrupt means in their power, and by other injudicious restraints. But, at the same time, the surplus produce of so poor a country could scarcely afford the basis of an extensive trade; and it was accordingly rather the medium of communication between other countries, than remarkable for the extent of its own commerce. Formerly merchants from Cashmere carried their manufactures to Kutti and other towns in Thibet, and received in return the wool produced in these countries from the shawl goat. Such portions of these manufactures as are not used in Thibet

were exported by the way of Teshoo Loomboo and Lassa, to Siling or Sining on the frontiers of China, and partly sent to Catmandoo by way of Patna. The principal goods imported in return to answer the demand of Cashmere and Nepaul were teas and silks; and from Patna, it is said, they exported otters' skins to a great amount, procured from the neighbourhood of Dacca. The articles imported into Nepaul from Thibet are coarse woollen cloths, paper, horses, sheep, shawl goats, chowry bullocks, chowries or cow-tails, musk-deer, dogs, falcons, pheasants, salt, sal-ammoniac, hurtal or yellow arsenic, borax, quicksilver from China, gold in grains and in small lumps, antimony, rugs or coarse blankets, munijheet or Indian madder, cherris or extract of hemp, besides various medicinal drugs and preserved fruits, such as almonds, walnuts, raisins, dates. Of these articles, the greater part of the musk, chowries, hurtal, borax, and bullion still find their way to Patna; whence in return are sent north, buffaloes, goats, broad cloth, cutlery, glass ware, and other European commodities, Indian cotton manufactures, mother of pearl, pearls, coral, beads, spices, pepper, betel nut and leaf, camphor, tobacco, tin, lead, zinc, and phajoo, the red powder thrown by the Hindus during the hooly. Besides these articles, utensils in wrought copper, brass, bell-metal, and iron, are sold to the merchants of Thibet. The borax and salt are said to be brought from a lake which is situated nearly north from Catmandoo, about fifteen days' journey beyond the Brahmaputra. The carriers of these articles are a large kind of sheep, with four horns, which appear to be the common beasts of burden in all countries towards the sources of the Indus, Ganges, and Brahmaputra. Formerly the lamas of Lassa and Teshoo Loomboo sent a large sum in bullion to be coined at the mint of Catmandoo, on which an allowance of four per cent. was made for the coinage. But the rapacity of the rajah induced him to alloy the rupee to the amount of eight per cent., which had the effect of putting an entire stop to this source of revenue.

The Newars are almost the only artisans in Nepaul; Manufactures and they appear to be acquainted with and to exercise most of the handicraft occupations of their neighbours. The Newar women of all ranks, as well as the men, of the hill-tribe of Mugar, weave two sorts of cotton cloth, partly for home use and partly for exportation. These cloths are the dresses of the middling and lower classes, although woollens would be much better fitted for the cold climate of a Nepaul winter. Those, accordingly, who are not very poor, wear woollen blankets, which are manufactured by the Bhooteas, who wear nothing else. The dress of the higher ranks is not manufactured at home, but is imported, consisting of Chinese silks, shawls, low country muslins, and calicoes. European broad cloth is worn by the military alone. They work very well in iron, copper, brass, &c.; and in Lalita, Patan, and Bhatgong, there are considerable manufactories of these articles, and also of a species of bell-metal. One bell which was manufactured at that place measured five feet in diameter. The Thibet bells are superior to those of Nepaul, though a great many bell-metal vessels are made by the Newars, and exported to Thibet, along with those of brass and copper. They are likewise particularly ingenious in carpentry; but it is remarkable that they never use a saw, dividing their wood, of whatever size, by a chisel and mallet. They are skilful in gilding; and they manufacture at Bhatgong, from the bark of a shrub, a very strong paper, remarkably well suited for packages. They distil spirits from rice and other grains, and also prepare a fermented liquor from wheat, munooa, rice, &c. which they call jhaur. It is made somewhat in the manner of malt liquors, but is more intoxicating. The Newar peasants use it in the same manner, and consider it as necessary for their comfort as the labouring people of Britain do porter.

Nepaul.
History.

The early history of Nepaul, like that of most of the eastern countries, is buried under a mass of fable. The inhabitants exhibit a list of princes for several thousand years back, which is given in Colonel Kirkpatrick's work, but without any evidence of their authenticity. It is doubtful whether such persons ever existed. We know, however, that Nepaul was the scene of important revolutions, though it never was subjected to the Delhi emperors, or to any of the other great Asiatic powers. It is said to have been completely subdued in A. D. 1323, by Hurr Singh, one of the princes of Oude, who was driven out of his own possessions by the Patans. But from that period there exists no accurate information respecting the dynasties which ruled during the interval, or the race of princes who governed Nepaul at the time of the Ghoorkha conquest. Runjeet Mull was the last of the Surya Bansi race, or children of the sun, that reigned in Nepaul. He formed an alliance with Purthi Nirain, which ended in the loss of his dominions, of which he was stript by his ally in the Newar year 890 or 888, corresponding to A. D. 1768. He possessed great courage and insatiable ambition, and was indebted for his success in war to his introduction of firelocks and European discipline amongst his troops. It was in his reign that Captain Kinloch, with a British force, endeavoured to penetrate into Nepaul. But, from the sickness of the troops, and the difficulty of the country, the enterprise was abandoned. Purthi Nirain died about three years after the final conquest of Nepaul, that is, in the year 1771. He left two sons, Singh Pertaub and Behadur Shah, the former of whom succeeded to the throne, and, conceiving a jealousy of his brother, threw him into prison, whence he was with difficulty released by the interference of one of the spiritual guides of the Ghoorkha family, on condition that he should live in exile. Singh Pertaub, after having extended his father's conquests, died in 1775, leaving one son, who was an infant. Behadur Shah, on the death of his brother, returned from his exile to Catmandoo, and, having placed his nephew on the throne, assumed the office of regent. But the mother of the infant prince, Rajender Letchemi, contrived to supplant Behadur Shah in his office, and even to secure the person of her rival. Through the mediation, however, of one of the priests, an accommodation took place, and Behadur Shah was thus enabled to seize and confine the ranee in his turn. Neglecting, however, to conciliate the chief men of the state, he was again driven into banishment, from which he did not return till the death of the princess, when he re-assumed the regency without opposition. In the course of his administration, Palpa, and many other petty states to the westward, Bhote to the north, and Sikkim to the east, were compelled to submit to the rule of the Ghoorkhas.

Towards the close of the administration of Mr Hastings in India the Ghoorkha sovereigns were involved in hostilities with Thibet, and finally with China. The Teshoo Lama of Thibet having proceeded to Peking, died soon after his arrival in that city. His brother, Sumhur Lama, taking advantage of his absence, fled from Lassa to the rajah of Nepaul, carrying along with him a considerable quantity of treasure; and he made such representations to the Nepaul government that their avarice was inflamed, and having marched a body of troops to Lassa, they extorted from the lama a tribute of three lacs of rupees. In 1790 they detached to Teshoo Loomboo, the residence of another sacred lama, a second body of troops, amounting to 7000 men, who pillaged the place and the sacred temples, and succeeded in carrying off a large booty, though closely pursued by a Chinese army, and though, from the severity of the weather, they lost 2000 men in their retreat. The emperor of China, as the terrestrial superior of the lamas, and their worshipper and protector, incensed by these unprovoked aggressions, despatched an army of 70,000 men

against the Nepaulese, who were overthrown in repeated battles; and the Chinese army advanced to Noakote, within twenty-six miles of Catmandoo, and sixty of the British territory of Bengal. A peace was at last concluded, though on terms ignominious to the Nepaulese, who were compelled to become tributaries to the Chinese, and to refund the spoil which they had taken from the Thibet lamas. It does not appear, however, that this tribute was ever exacted. It was about this period that Lord Cornwallis attempted to conclude a treaty of commerce with the Nepaulese; but every proposition of this nature was frustrated by their extreme jealousy.

The queen-regent died in 1786, when the care of the young rajah devolved entirely on his uncle Bahadur Shah, who was accused of having, from disgraceful motives, encouraged the rajah in his debaucheries, in hopes of bringing him into contempt, and of thus securing to himself the reins of authority. In this expectation, however, he was deceived, as the rajah, in 1795, when he had entered into his twentieth year, suddenly announced to his uncle that he had now resolved to assume the reins of government, and being supported by a large proportion of the nobles, Bahadur Shah, making a virtue of necessity, forbore all resistance, and received in return assurances of the most distinguished favour. The young rajah rendered himself extremely popular during the first year of his reign. But this fair prospect was speedily overcast, and the youth plunged into all the excesses of the most furious despotism and cruelty. His first act was to arrest his uncle, and, loading him with chains, to throw him into prison, where he was starved to death. He daily tortured and mutilated his subjects, and beheld their sufferings with savage joy. In his outrages he made no distinction of age or sex. Women of all castes, even those belonging to the sacred orders, were seized, and subjected to abuse from the vilest characters. In 1797, he had a son by a brahmin widow, who being taken seriously ill next year, and finding her end approaching, reminded the rajah of the prediction of astrologers, that he would never complete his twenty-fourth year, and entreated that he would provide for the unprotected orphan they were about to leave. The rajah, relying implicitly on the superstitious prophecy, immediately, and in the most solemn manner, before all the chiefs, abdicated the throne in favour of his son, though illegitimate, and an administration was then appointed, over which one of his ranees or queens was appointed to preside. The abdicated monarch now devoted his whole time to attendance on his favourite widow, who, notwithstanding all his attention, and rich offerings at the different temples, soon afterwards expired. In his affliction he became quite frantic, and perpetrated atrocities, the bare mention of which causes the Nepaulese still to shudder, and which are too shocking to be narrated. Amongst various enormities, he directed the sacred temple of Bahvani to be demolished, and the golden idol, which was a venerated object of worship, to be ground to dust; and when the soldiers to whom he had issued the orders demurred at such an act of sacrilege, he commanded boiling oil to be poured on their naked bodies. Nor did any one escape his rage. Neither rank nor caste afforded any protection from his violence. Even the first members of the government were scourged without mercy, and otherwise tortured. A confederacy was at last formed against the tyrant, who finding himself abandoned, absconded during the night, and fled to Benares, which he reached in May 1800.

A close connection with Nepaul had always been a favourite object with the British rulers of India, and the flight of the rajah to Benares appeared to present a fair opportunity for bringing it about. A treaty of alliance was accordingly concluded between the two states, by Captain W. D. Knox, who was appointed ambassador,

Nepaul.

Nepaul. and who proceeded to Catmandoo for the purpose in 1802. The terms of the treaty were considered as favourable to the British interests; the Nepaulese being anxious to secure the influence of such powerful neighbours against the faction of the abdicated rajah, who still contended for his restoration. But whatever advantages were attained by this treaty, were ultimately rendered nugatory by the jealous opposition of the subordinate officers amongst the Nepaulese, who were probably instigated by their chiefs, the latter being entirely unable to fulfil the obligations which they had entered into.

The residency at Catmandoo was accordingly withdrawn in the year 1804. About this time the abdicated monarch, Run Bahadur, by the able management of his queen, whom he had always ill treated, was restored to his former authority. But as he continued to rule with his former barbarity, his reign was of short duration; in 1805 a conspiracy was formed against him, which terminated in his assassination. His death was succeeded by the most violent conflicts between the adverse parties in the state, and did not terminate until nearly the whole of the nobles at Catmandoo had perished. The surviving adherents of the late rajah having at length secured the person of his son, seized on the reins of government, putting to death such of the opposite party as still remained.

But during all these intestine commotions, it is remarkable that the Nepaulese still extended their conquests on every side. To the west of Catmandoo, and towards the Sutlege, the hill-chiefs were distracted by mutual jealousies, and by no means in a condition to form a league for their mutual defence. They were accordingly subdued one after another by the armies of the Ghoorkhas, who very soon made themselves masters, without the aid of artillery, of every hill-fort, from the Ganges to the Sutlege. When their movements first attracted the notice of the British government, their chief was vigorously prosecuting the conquests of these states; and as he advanced westward, he erected strong forts and stockades at convenient positions, namely, Almorah, Serinagur, and Malowa. The Sikh frontier was also guarded by a strong line of fortified posts; and thus the consolidation of the Ghoorkha empire proceeded with a slow but sure progress. The extensive tract which lies between Catmandoo and the Sutlege was held in firm subjection by a strong military force, whilst to the east the Sikkim rajah was deprived of half his territories, and compelled to pay a tribute for the remainder. To the north the progress of conquest was restrained by the Chinese power, with which the Ghoorkha chiefs had already found themselves unable to cope, and also by a lofty range of barren mountains. But the fertile and low situated plains of the south presented a more alluring prospect, and greater probabilities of success in a contest with a new and untried power. The consequence was a series of encroachments along the whole northern frontier of the British possessions, especially in the district of Gorruckpoor and Sarun. The British remonstrated against these proceedings, and an investigation into the respective claims of the two powers was commenced by commissioners jointly chosen, the result of which being entirely favourable to the British, a detachment of regulars was ordered to take possession of the debateable ground. But these being withdrawn during the rainy season, the chief police station upon the frontier was attacked by large bodies of Nepaulese, and the officers were compelled to fly, with a loss of eighteen killed and six wounded. Shortly afterwards a second attack was made on another police station, and several persons were killed, after which the whole body was withdrawn; and, in 1814, the war commenced. A brief account of the operations of this war will be found under the article HINDUSTAN; and it is only necessary here to state generally, that the invasion of the Nepaulese dominions was

commenced on the western frontier, beyond the Jumna and near the Sutlege, the country there being considered as of easier access than the mountainous barrier which bounds the Nepaulese dominions on the side of Bengal. But the British troops, in attempting to storm the stockades and hill-forts, were repeatedly driven back with severe loss, and suffered reverses to which they had been wholly unused in the wars of India. Here it was that the brave General Gillespie was slain, whilst he was encouraging his troops, who had been repulsed, to renew the attack. In 1815, Sir David Ochterlony assumed the chief command, and by a series of skilful operations, in which he dislodged the Ghoorkha troops from the fortified heights of Malowa, and ultimately so hemmed in their renowned commander Ameer Singh, and his son, that they were forced to sign a capitulation, by which they agreed, on being permitted to retreat with their remaining troops, to abandon the whole territory west of the Cali branch of the Goggra. In Kumaon also the British troops succeeded in driving the enemy before them; and, in consequence of these successes, a definitive treaty of peace was signed on the 28th of November 1815. But the signature of the rajah being withheld, it was determined to renew the war, and to strike a decisive blow directly at the capital of the country. Preparations for this arduous enterprise were made on a great scale, a force being assembled at Sarun amounting to about 13,000 men, of whom 3000 were Europeans, besides a large body of irregulars, amounting in all to above 46,000 troops. This formidable force took the field in the end of January 1816, and advanced from the Bettiah district directly on Catmandoo. The greatest difficulties were encountered, from the ruggedness of the country, in marching along the dry beds of torrents, through ravines, and in the face of precipices. But all these obstacles were overcome by the patience of the troops, and the consummate skill and science of their commander. The Ghoorkhas made a brave resistance, but they were overthrown in several severe encounters; and the British force had now approached within three days' march of their capital, Catmandoo. Deeming all further resistance vain, an ambassador was sent to the British head-quarters, to sue for peace; and the unratified treaty of the year 1815 was accordingly duly signed. By this treaty the Nepaulese renounced all claims to the territory in dispute. They also ceded all the conquests which they had made to the west of the Cali branch of the Goggra, and which, with the exception of Kumaon, the Deyrah Doon, and some other portions of territory annexed to the British dominions, were restored to the families of the chiefs who had reigned there prior to the Ghoorkha invasion, and who were now to rule as vassals of the British; it being understood, however, that the latter were not to interfere in the internal administration, but were merely to act as arbiters between rival chiefs.

In the course of this contest with the British, the Nepaulese had earnestly entreated the aid of the Chinese against the Europeans, whom their ambassadors represented as desirous of acquiring Nepal merely to serve as an intervening point in their progress to China. Their application being transmitted by the grand lama to Peking, an answer was received, in which the emperor expressed his conviction that the Ghoorkhas had themselves been the cause of the war by their unjust encroachments, and declined all interference. After peace was concluded, the Chinese emperor expressed deep offence against the rulers of Nepal, who, being merely tributaries, had presumed to make war or peace with the British, without the sanction of their superior; and, to back those lofty pretensions, an army of 15,000 men, commanded by five generals, and attended by Chinese functionaries of superior rank, usually stationed at Lassa, actually advanced towards the Nepaulese territories. At the request of the Nepal ministers,

Nepean
Island
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Nepos.

the British consented to act as mediators. But in the mean time they themselves despatched to the Chinese camp agents, who having reached it early in September 1816, succeeded in bringing about the restoration of peace, and of all the ancient relations between the two powers. In 1816, Ameer Singh Thappa, one of the most distinguished Ghoorkha commanders, who had so gallantly disputed the field with Sir David Ochterlony, died, at the age of sixty-eight. To the last day of his life he was endeavouring, by negotiation, and by every art, to excite amongst the different states a spirit of hostility against the British, as the common enemies of Indian independence. Two of his widows devoted themselves to death along with him; one sacrificed herself on the spot, and the other was at the same time preparing for the fatal pile at the temple of Pushpoonath, within the valley of Catmandoo. In November 1816, the young rajah died of the small-pox, at the age of twenty-one years. One of his queens, and one of his concubines, together with five female attendants, devoted themselves to the funeral pile along with the corpse. He left one son, three years of age, named Rajindra Bickram Shah, who succeeded quietly to the throne, under the guardianship of the minister Bheem Singh Thappa; a very unusual circumstance in the annals of Nepaul. No interruption has occurred since this period to the peace happily concluded with the British; nor, according to the latest accounts, has the internal tranquillity of the country been disturbed. (F.)

NEPEAN ISLAND, in the South Pacific Ocean, is about a quarter of a mile distant from Norfolk Island. The communication, however, is rendered difficult by the mountainous sea which runs between the two islands, and which, during the short period they have been occupied by British settlers, has occasioned numerous fatal accidents. It is uninhabited, and is employed as a place of transportation for refractory convicts, where they are employed in boiling salt.

NEPEAN POINT, a rocky promontory on the north coast of New Holland, and the eastern point of entrance into Port Philip. Long. 144. 38. E. Lat. 38. 18. S.

NEPOMUK, a town of the Austrian kingdom of Bohemia, in the circle of Klattau, adjoining to which are some extensive iron-works and mines, on the hill called the Grunenburg, belonging to Prince Colloredo. It is a place highly venerated, from having given birth to John Nepomuk, in the year 1320. That person is reported to have been confessor to the queen, whose chastity was suspected by her spouse. He demanded of the confessor the revelation of what had passed in the confession; but Nepomuk refused to disclose it. For this he was bound hand and foot; and still refusing to discover the secrets, was in that condition thrown into the Moldau and drowned. He was afterwards, for this conduct, canonized by the pope, and included in the catalogue of martyrs. He thus became the tutelar saint of the Bohemian Catholics.

NEPOS, CORNELIUS, a Latin writer, who was the friend of Cicero, Atticus, and the poet Catullus, and flourished B. C. 40. It is uncertain where he was born, but Pliny (iii. 22, 2) calls him *Padi accola*; and his friendship with Catullus makes it not improbable that Hostilia, near Verona, where that poet was born, was also his birthplace. We possess no information respecting his private life; but many of his works are cited by later writers. 1. His *Chronicles* or *Annals*, probably in three books, of which the fragments do not enable us to decide whether they were confined to the history of Rome, or included that of all nations. Some have asserted that this was a mere translation of the work of Apollodorus on the same subject; but they have no sufficient grounds for so believing. 2. The *Exemplorum Libri*, of which the fifth book is cited by Aulus Gellius (vii. 18), and which seems to have been a work containing remarkable transactions selected from

history; but this may have been only another title for his work. 3. The *Lives of Illustrious Men*, of which the sixteenth book is cited, and the lives we now possess no doubt formed a part. 4. The *Lives of Historians* (Nep. Dion. iii.), which included both Greek and Latin. It seems not unlikely that the biographical sketch still remaining of Atticus, and the longer one of Porcius Cato, which he mentions (Cato, iii.), belonged to this collection. 5. The *Letters to Cicero*, which must have been published, as some of them are quoted by Lactantius (Inst. iii. 15). It would appear that he had also made successful attempts in poetry (Plin. Ep. v. 3).

We possess a work under the name of Nepos, *Vite Excellentium Imperatorum*, which is not mentioned by any ancient writer under this title. It contains short biographical sketches of twenty commanders, mostly Greek; an essay, *De Regibus*, which is little else than the mere names of Greek and Persian kings; and the lives of Hamilcar and Hannibal. There are also two other biographical sketches of Atticus and Cato, which used to be separated from the rest, because they were not found in all the manuscripts, or, when found, were entitled *Ex libro Corn. Nepotis de Latinis Historicis*, whilst the others used to be considered as the work of a certain Æmilius Probus, whose name was found in all the manuscripts. The following unpoetical lines were found to precede them:

Vade liber noster, fato meliore memento,
Cum legat hæc dominus, te sciat esse meum.
Si roget auctorem, paullatim detege nostrum
Tunc domino nomen, me sciet esse Probum.

This Æmilius Probus was long considered as a contemporary of Nepos; but he is now generally believed to be the *præfectus prætorio* to whom Ausonius addresses his sixteenth epistle, and is supposed to have lived in the reign of Theodosius, A. D. 370. At first, however, this work appeared under the name of Probus, and was thus published 1471, and in the following editions till 1563. Gifanius in 1566 first directed the attention of the literary world to Nepos as the author; and subsequent investigation has nearly set the question at rest. Attempts have, however, been recently made by an Italian critic (in his *Saggio di un Esame critico per restituire ad Emilio Probo il libro De Vitis Excell. Imp. creduto comunemente de Corn. Nepote*, Venez. 1818, et Kohen; and in *Considerazioni sul Saggio di un Esame del Sign. Rinck. Mediol. 1819*) to revive the old opinion; and he founds his belief on the authority of the manuscripts and of the poetical address or dedication, on the silence of ancient writers, to whom these lives seem to have been unknown, on several mistakes in history and chronology which appear in the work, and on the language, which he considers as unworthy of the golden age of Roman literature. (See this question treated fully by Bardili, in his preface to his edition, Stuttgart, 1820; and by Dähne, Lips. 1827.)

NEPTUNE, in pagan worship, the god of the sea, was the son of Saturn and Vesta or Ops, and the brother of Jupiter and Pluto. He assisted Jupiter in his expeditions, for which reason that god, when he attained the supreme power, assigned to him the sea and the islands as his empire. He was, however, expelled from heaven along with Apollo, for conspiring against Jupiter; and after this event both were employed by Laomedon, king of Phrygia, in building the walls of Troy; but that prince having dismissed Neptune without a reward, the latter in revenge sent a sea-monster to lay waste the country. He is said to have been the original inventor of horsemanship and chariot racing, on which account Mithridates king of Pontus threw chariots drawn by four horses into the sea in honour of this god, and the Romans had horse-races in the circus during his festival, when all other horses left working, and the mules were adorned with wreaths of flowers. In a contest with Mi-

Neptune.

Neptune's
Isles
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Nereus

nerva he produced a horse by striking the earth with his trident; and on another occasion, in a trial of skill with Minerva and Vulcan, he produced a bull, for which reason that animal was sacrificed to him. His favourite wife was Amphytrite, whom he long courted in vain, till sending a dolphin to intercede for him, he met with success, and the dolphin was rewarded by being placed amongst the stars. Besides Amphytrite, he had two other wives; one of whom was called Salasia, from the salt water, and the other Venilia, from the ebbing and flowing of the tides. He had likewise many concubines, by whom he had a great number of children. He is represented with black hair, and a garment of an azure or sea-green, holding his trident in his hand, seated in a large shell drawn by sea-horses, and attended by the sea-gods Palemon, Glaucus, and Phorcys, and the goddesses Thetis, Melita, and Panopæa, with a long train of tritons and sea-nymphs. This deity was known in Egypt by the name of *Canobus* or *Canopus*, and was worshipped as the *numen aquarum*, or spirit of the Nile.

NEPTUNE'S ISLES, a cluster of low islands situated on the south coast of New Holland, at the entrance into Spencer's Gulf.

NERAC, an arrondissement of the department of the Lot and Garonne, in France, 502 square miles in extent. It contains seven cantons, divided into seventy-eight communes, and inhabited by 60,879 persons. The capital is the city of the same name, situated on a fruitful plain, through which the river Blaise runs. In a castle now in ruins the kings of Navarre held their court, and Henry IV. of France passed his youth in it. In the year 1836 it contained 6603 inhabitants, who make cotton goods, druggets, and serges; leather, glass, and domestic articles of copper ware; and carry on considerable trade in corn, wine, and other productions of the soil. Long. 0. 13. E. Lat. 44. 10. N.

NERBUDDAH, a large river of Hindustan, in the province of Gundwana, which, after a course of 750 miles, falls into the Gulf of Cambay. This river has its source at Omercuntuc, in the above province, close to that of the Soane. The Mahanuddy has also its source in the same mountain. A Hindu temple is found in the centre of the table-land at Omercuntuc; and here the Nerbuddah rises from a small well, and flows along in a smooth stream, until it is precipitated into the Mundlah. This is described as a great fall by the natives; and the river at the foot of the table-land expands into a wide surface, and, being joined by other streams, assumes the appearance of a large river. From this point its course is due west, with the straightest course of any river perhaps in the world. It passes through Gundwana, Khandesh, Mulwah, and Gujerat, and, after passing the city of Broach, falls into the Gulf of Cambay, and is navigable for boats to a considerable distance. This river was in former times the boundary between Hindustan Proper and the Deccan or southern peninsula. It is sometimes called the Reva.

NEREIDS, in the pagan theology, sea-nymphs, daughters of Nereus and Dorus. The Nereids were esteemed very handsome, insomuch that Cassiope, the wife of Cepheus, king of Ethiopia, having triumphed over all the beauties of the age, and dared to vie with the Nereids, they were so enraged that they sent a prodigious sea-monster into the country; and, to appease them, Cassiope was commanded by the oracle to expose her daughter Andromeda, bound to a rock, to be devoured by the monster. In ancient monuments, the Nereids are represented as riding upon sea-horses; sometimes with an entire human form, and at other times with the tail of a fish.

NEREUS, in fabulous history, a marine deity, was son of Oceanus and Thetis. He settled in the Ægean Sea, was considered as a prophet, had the power of assuming whatever form he pleased, and married his sister Doris, by whom he had fifty daughters called the Nereids,

who constantly attended on Neptune, and when he went abroad surrounded his chariot. Nero.

NERO, CLAUDIUS CÆSAR, the sixth of the Cæsars, was the fourth Roman emperor in succession from Augustus, and descended from a family which had taken an active part in all the important political transactions of their country. This family, however, had partaken of the degeneracy of the times, and the more immediate predecessors of Nero had been more distinguished for their follies and extravagancies than for the stern virtues of the earlier ages. His grandfather, Cneius Domitius, was chiefly known for the cruelties he had allowed to be perpetrated in the gladiatorial exhibitions, which it was at last found necessary to put down by a public edict, the private remonstrances of Augustus having been disregarded. Cneius Domitius was married to Antonia Major, the elder daughter of Marc Antony by Octavia, sister to Augustus, and had by her L. Domitius, the father of Nero. L. Domitius attended C. Cæsar to the East, where he was dismissed with ignominy, because he had put to death his freedman for refusing to drink as much wine as he ordered. Towards the end of the reign of Tiberius, he was accused of a variety of enormities, and only escaped by the death of the emperor. He was married to Agrippina, the daughter of Germanicus, and the sister of Caligula the emperor.

Nero was born at Antium, in Latium, on the 15th of December, A. D. 37, nine months after the murder of Tiberius, and in the first year of Caligula's reign. On receiving the congratulations of his friends, his father said that it was no subject of joy, as he was certain that nothing good could spring from such parents as himself and Agrippina. Nero lost his father in his third year, and was at the same time deprived by Caligula of his patrimonial estate. The young Nero took refuge in the house of his aunt, Æmilia Lepida, till the accession of Claudius, A. D. 41, when the property of his father was restored, and he also became the heir of his step-father, Crispus Passienus, an old rich senator, whom his mother had in the meanwhile married. In his eleventh year he was adopted by the Emperor Claudius, A. D. 48, who had been induced, by the wiles of his mother, to raise her to the imperial throne. He was now placed under the tuition of the philosopher Annæus Seneca; but the pernicious doctrines and example of a corrupt court were far more likely to make an impression upon the youthful mind of Nero than the stern doctrines of the philosopher. We must not therefore place the follies of the prince to the account of Seneca, nor conclude that he did not perform his duty towards him. In his seventeenth year, A. D. 54, he married Octavia, the daughter of Claudius; and the same year he ascended the throne (13th of October), on the death of the emperor, who was supposed to have been poisoned by Agrippina.

Nero began his reign with the usual professions of respect for the senate, and of an intention to take its opinion in all matters of importance. The administration of affairs was chiefly in the hands of Agrippina, of Burrus the prefect of the prætorian guard, and of Seneca the instructor of the emperor. The two latter tried to moderate the furious proceedings of Agrippina, and to prevent her from taking any part in public affairs. Her quarrels with Nero soon enabled them to succeed in this object, as her imperious disposition could endure no rival. Her friend Pallas, who had assisted her to get rid of Claudius, was ordered to retire from court; and Britannicus, the son of Claudius, whose cause Agrippina threatened to espouse, was removed by poison. In the meanwhile, Nero amused himself by night in traversing the streets of Rome in search of adventures: he used to attack people returning from supper, and even to break into shops and rob them, sometimes at the risk of his life. The most innocent of his amusements was music, of which he is said to have been passionately fond.

Nero. His whole time was devoted to the cultivation of this taste, and, after he had delighted the ears of private parties with his vocal powers, he at last made his appearance upon the public stage, at Naples, A. D. 64, and was of course much applauded. It is said, that whilst he was performing, the theatre was shaken violently by an earthquake, but that he was so absorbed with the music that he did not perceive it. Agrippina made many attempts to regain her influence over her son, and some of these were of the most flagitious kind; but Nero having become entirely devoted to Poppæa Sabina, was encouraged by her to get rid of Agrippina. After making several abortive attempts, he at last succeeded, A. D. 59; and, that he might be legally united to Poppæa, he ordered his wife Octavia to be put to death, A. D. 62. By Poppæa he had one daughter, who died in infancy; and he is said to have soon got rid of this woman by striking her with his heel on the stomach when she annoyed him by complaining of his being frequently absent from her. The dreadful conflagration which happened at Rome, A. D. 64, was generally believed at the time to have been caused by his orders; and it was even said, that at the moment when it was raging most furiously, he appeared on the top of the palace of Mæcenas, on the Esquiline Hill, and sung part of a tragedy entitled the Burning of Troy. It continued to rage during six days, and was only at last stopped by throwing down some of the houses, and thereby preventing the communication of the fire. The use which Nero afterwards made of the space thus cleared by the fire was a strong corroboration of the truth of the report. He appropriated the ground to himself, and erected a palace, called *Aurea Domus* from its magnificence, but which was still more remarkable for the beauty of the gardens and ground attached to it. They were laid out under the direction of Severus and Celer, two engineers, who proposed to him to cut a canal along the coast, from Lake Avernus to Ostia, a distance of 160 miles. What advantage he supposed likely to arise from such a project it is difficult to discover; but he actually commenced it in the vicinity of Cumæ, and it is supposed that the *Lago di Licola* is the remains of this foolish enterprise. Another work which he attempted had been projected by Caligula. This was to cut through the Isthmus of Corinth; and so much interest did he take in the work, that he commenced it with his own hand, in order to encourage the workmen to proceed in it with zeal. The people were so firmly convinced that the conflagration had been the work of incendiaries, that Nero found it necessary to turn the public indignation in some other direction than himself. The Christians were at this time attracting attention, and, like most new sects, were charged by their enemies with the most atrocious crimes. Nero accused them of having set fire to the city, and many were in consequence put to the most cruel deaths. His conduct had now excited very general indignation against him; and as no one felt secure of his life, a conspiracy was entered into by all the principal men in Rome, including Seneca, and Lucan the poet. It does not appear that Seneca had any thing farther to do with the conspiracy than that he was cognizant of it. The conspiracy, however, was discovered, A. D. 65, and most of the conspirators were put to death. On the murder of Poppæa, Nero proposed to marry Antonia, daughter of Claudius; but she preferred death to an union with such an inhuman monster. He married Stetilia Messalina, by whom he had no children. The first circumstance which excited his alarm was the revolt of Vindex, governor of Gaul, who published a manifesto against him, in which he gave the greatest annoyance to Nero by calling him a miserable and despicable musician. Nothing could have given Nero greater pain than such an assertion. A few days afterwards he received intelligence from Spain of the desertion of Galba, who was destined to be emperor; and he at once gave himself up for lost. He sent some

of his most faithful freedmen to prepare some ships at Ostia for flight, and in the meanwhile solicited some tribunes and centurions of the prætorian guard to accompany him; but on various pretexts they refused. He soon found himself completely abandoned by all except a few of his freedmen, one of whom, Phaon, offered to conceal him in his villa, about four miles from Rome, between the Via Salaria and Nomentana. But on his way thither he was recognised by a soldier, and though he reached his place of concealment, he was soon discovered, and had only time to give himself a mortal wound when his enemies appeared. He died on the 9th of June, A. D. 68, in the thirty-second year of his age, and the anniversary day on which he had put his wife Octavia to death. He was succeeded by Galba, the last of the family of Augustus who ruled the Roman empire. (Suetonius' Life of Nero; Dion. Cassius, in the Extracts of Zephilinus; Tacitus' Annals, books xiii.-xvi.)

NERTSCHINK, a town of Asia, under the jurisdiction of Russia. It is situated on the Chinese frontier; but its importance has much declined since the route of the Chinese caravans, which was formerly through this town, has been changed to the route of Selinginsk. A few merchants still remain, who carry on a small fur trade, particularly in sables. It was built in 1658, and was then merely a palisadoed fort; but in 1781 it was raised to the rank of a town. It contains two churches, and about 2000 inhabitants, including the military. The neighbouring mountains afford excellent pasturage, but the district is chiefly distinguished by the mines of lead and silver, which are worked by the crown; and persons condemned to exile are employed in this remote part of the empire. Long. 116. 44. E. Lat. 51. 56. N.

NERVA, M. COCCEIUS, the eleventh Roman emperor in succession from Augustus, was born A. D. 33, in the twentieth year of the reign of Tiberius. It is curious that his name is scarcely mentioned in history till he ascended the imperial throne, after he had passed his sixtieth year. He was probably the relation of Cocceius Nerva, who is described by Tacitus (*Ann.* vi. 26) as distinguished for his knowledge of law, and as having put himself to death rather than survive his friends, who had fallen a sacrifice to the tyranny of Tiberius. We find him consul A. D. 71, being the second year of the reign of Vespasian, and a second time A. D. 90, in the tenth year of the reign of Domitian; but history records nothing for which he was distinguished. Towards the close of Domitian's reign, he was in exile with many good men at Tarentum; and hearing of the bold defence made by Pliny the younger for the inhabitants of Bœtica against Bœbius Massa, he wrote to Pliny to congratulate him on the example he had given. (*Plin. Ep.* iii. 33.) When the conspirators had resolved to put to death the Emperor Domitian, they found it no easy task to discover a person who would agree to be his successor, as every one suspected that it was a snare laid by Domitian himself to entrap them. Nerva, however, was persuaded to run the risk, an astrologer having some time before predicted that he would ascend the imperial throne. Domitian was murdered on the 18th of September A. D. 96, and Nerva was on the same day saluted emperor. The kind and benevolent disposition of Nerva must have been doubly felt from its strong contrast with the ferocious cruelty of his predecessor. One of his first acts was to release all those who had been accused of what was designated impiety, which consisted of the slightest neglect of respect to the emperor or his statues. This law was of so comprehensive a nature, that it was scarcely possible to escape, and the only chance seemed to be, by being active in the accusation of others. Domitian had also passed a severe law against those who practised Jewish rites, by which profane writers no doubt meant the followers of the Christian reli-

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gion; but Nerva refused to listen to any such accusations. Whatever property had been taken unjustly by Domitian he restored to its lawful owners; and he at the same time did every thing in his power to lessen the expenses of the state. He swore in the senate that no senator should be put to death by his orders; and even when a conspiracy was formed against him, he kept to his resolution. He used frequently to say that he had done nothing to prevent him living in safety as a private citizen if he chose to lay down his authority. In nothing did he show his sagacity and his anxiety to secure the happiness of the empire more than by his adoption of M. Ulpius Nerva Trajanus to be his successor, although he was not without many near relatives. He died, after a reign of sixteen months, on the 27th of January, A. D. 98, in the sixty-fifth year of his age. (Xiphilinus, Extracts from Dion Cassius.)

NERVES, certain white glistening chords, proceeding from the brain and spinal marrow, and dividing into very small branches, which are sent off throughout all parts of the body, and which form the organs of sensation and motion. See the articles ANATOMY and PHYSIOLOGY.

NESA, a town of Khorasm, or Independent Tartary, which was taken and nearly destroyed by Genghis Khan in 1221, after a siege of fifteen days. It is situated near the Persian province of Khorassan, 100 miles north of Meshed.

NESHIN, a circle in the Russian province Tschernigow, extending in north latitude from 50. 32. to 52. 26. and in east longitude from 21. 19. to 22. 43. It is one of the most extensive but poorest portions of the ancient Ukraine. The capital is a city of the same name, situated on the river Ostin, 822 miles from St Petersburg, and is the best built city, not only of the province, but of the country which was formerly known as Little Russia. It is surrounded with walls and defended by a citadel; and it contains fifteen churches, 3000 houses, and 16,500 industrious inhabitants. There are several establishments of Greeks and Arminians, who have manufactories of silk goods, soap, leather, liqueurs, and especially of perfumery, which is dispersed throughout the whole of Russia, and sent into Moldavia, Poland, Hungary, and even to Vienna. There are three great annual fairs, at which much business is transacted in wool, tobacco, honey, wax, salt, and manufactured goods. Public schools are maintained for instruction in the classical languages, and in modern Greek. It is situated in north latitude 51. 2. 45. and east longitude 21. 44. 25.

NESSUS, in fabulous history, was a celebrated Centaur, the son of Ixion and a Cloud. He offered violence to Dejanira, whom Hercules had intrusted to his care, with orders to carry her across the river Evenus. Hercules saw the distress of his wife from the opposite shore of the river, and immediately let fly one of his poisoned arrows, which struck the Centaur to the heart. Nessus, as he expired, gave the tunic which he then wore to Dejanira, assuring her that from the poisoned blood which flowed from his wound it had received the power of calling a husband away from unlawful loves. Dejanira received it with pleasure, and this mournful present caused the death of Hercules.

NESTON, a town of the county of Chester, in the hundred of Wirral, near Parkgate, ten miles from the city of Chester, and 190 miles from London. The parish is large, and contains no fewer than seven other townships. Great Neston had, in 1801, 1486 inhabitants; in 1811, 1332; in 1821, 1418; and in 1831, 1633.

NESTOR, in fabulous history, was the son of Neleus and Chloris, nephew to Pelias, and grandson to Neptune. He had eleven brothers, who, with his father, were all killed by Hercules. His tender age detained him at home, and proved the cause of his preservation. The conque-

ror spared his life, and placed him upon the throne of Nestorians. Pylos. He married Eurydice, the daughter of Clymenus; or, according to others, Anaxibia, the daughter of Atreus. He soon distinguished himself in the field of battle, and was present at the nuptials of Pirithous, when a bloody encounter took place between the Centaurs and the Lapithæ. As king of Pylos and Messenia, he led his subjects to the Trojan war, where he distinguished himself amongst the Grecian chiefs, by his eloquence, address, wisdom, justice, and sagacity. After the Trojan war, Nestor returned to Greece, where he enjoyed in the bosom of his family the peace and tranquillity which were necessary at his advanced age. The manner and the time of his death are equally unknown. The ancients are all agreed that he outlived three generations of men. He had two daughters, Pisidice and Polycaste; and seven sons, Perseus, Straticus, Aretus, Echephron, Pisistratus, Antiochus, and Thrasymedes.

NESTOR, a person whose secular name is not known, was a native of Russia, and the earliest historian of the north. He was born at the town of Bielozero in the year 1056, and in the nineteenth year of his age he assumed the monastic habit, in the convent of Petcherski, at Kiew, and took the name of Nestor. He there made considerable proficiency in the Greek language, but appears to have formed his style and manner rather from the study of the Byzantine historians, Cedrenus, Zonaras, and Syncellus, than from that of the ancient classics. The time of Nestor's death has not been ascertained; but he is supposed to have lived to an advanced age, and to have died about the year 1115. His great work is his *Chronicle*, to which he has prefixed an introduction. In this work, after a short sketch of the early state of the world, taken from the Byzantine writers, he gives a geographical description of Russia and the adjacent regions; with an account of the Sclavonian nations, their manners, their emigrations from the banks of the Danube, their dispersion, and their settlement in the several countries in which their descendants are now established. He then enters upon a chronological series of the Russian annals, from the year 858 to about 1113. His style is simple and unadorned, being such as best suits a mere recorder of facts; and his chronological exactness, although it renders his narrative dry and tedious, has enabled him to fix the era and to determine the authenticity of the events which he relates.

NESTORIANS, a sect of ancient Christians, who held that Mary was not the mother of God. They received their name from Nestorius, bishop of Constantinople, whose doctrines were spread with much zeal throughout Syria, Egypt, and Persia. One of the chief promoters of the Nestorian cause was Barsumas, who appears to have been created Bishop of Nisibis in the year 435. Such were his zeal and success, that the Nestorians considered him alone as their parent and founder. By him Pherozes the Persian monarch was persuaded to expel those Christians who had adopted the opinions of the Greeks; to admit the Nestorians in their place; and to put the latter in possession of the principal seat of ecclesiastical authority in Persia, namely, the see of Seleucia. Barsumas also erected at Nisibis a school, from which proceeded those Nestorian doctors who in the fifth and sixth centuries spread their tenets throughout Egypt, Syria, Arabia, India, Tartary, and China. He differed considerably from Nestorius, in holding that there are two persons in Jesus Christ, as well as that the virgin was not his mother as God, but only as man. The abettors of this doctrine refuse the title Nestorians, alleging that it had been handed down from the earliest times of the Christian church. In the tenth century, the Nestorians in Chaldaea, whence they were sometimes called *Chaldaeans*, extended their spiritual conquests beyond the Imaus, and introduced the Christian religion into Tartary properly so called, espe-

Nestorius. cially into the country bordering on the northern part of China. The prince of that country, whom the Nestorians converted to the Christian faith, is said to have assumed, after his baptism, the name of John, to which, from a principle of modesty, he added the surname of presbyter; and hence it is said that his successors were each of them called *Prester John* until the time of Ghengis Khan. But Mosheim observes, that the famous Prester John did not begin to reign in that part of Asia before the conclusion of the eleventh century. The Nestorians formed so considerable a body of Christians, that the missionaries of Rome were industrious in their endeavours to reduce them under the papal yoke; and for this purpose Innocent IV. in 1246, and Nicolas IV. in 1278, employed their utmost efforts, but without success. Till the time of Julius III. the Nestorians acknowledged but one patriarch, who resided first at Bagdad, and afterwards at Mosul; but a division having arisen amongst them, in the year 1551 the patriarchate became divided, at least for a time, and Julius consecrated a new patriarch, whose successors fixed their residence in the city of Ormus, in the mountainous part of Persia, where they were distinguished by the name of Simeon. The great Nestorian pontiffs, who form the opposite party, and look with a hostile eye on this patriarch, have since the year 1559 been distinguished by the name of Elias, and reside constantly in the city of Mosul. Their spiritual dominion is very extensive, including a great part of Asia, and comprehending also within its circuit the Arabian Nestorians, and the Christians of St Thomas, who dwell along the coast of Malabar. About the middle of the seventeenth century, the Catholic missionaries gained over to the communion of Rome a small number of Nestorians, whom they formed into a congregation or church, the patriarchs or bishops of which resided in the city of Amida, or Diarbekir, and all assumed the denomination of Joseph. But the Nestorians in general persevered in their refusal to enter into the communion of the Church of Rome.

NESTORIUS, from whom the sect of Nestorian Christians derive their name, was born in Germanica, a city of Syria. He received his education at Antioch, where he was likewise baptized; and soon afterwards he withdrew to a monastery in the suburbs of that city. Upon being admitted into the order of priesthood, he acquired so great reputation, by the eloquence of his preaching, and the regularity of his life, that the Emperor Theodosius deemed him a fit person to fill the second see in the Christian church; and he was accordingly consecrated Bishop of Constantinople in the year 429. In one of his first sermons after his promotion, he publicly declared his intention to make war upon heretics, and called upon the emperor to free the earth from heretics, promising to give him heaven as a reward for his zeal; and adding, "Join with me in war against them, and I will assist you against the Persians." Although the wiser and better part of his audience were amazed to see a man, before he had tasted the water of his city, as an historian expresses it, declare that he would persecute all who were not of his opinion, yet the majority of the people approved of this discourse, and encouraged him to execute his purpose. Accordingly, five days after his consecration, he attempted to demolish the church in which the Arians secretly held their assemblies; and he succeeded so far in his design, that these people, rendered desperate, set it on fire of their own accord, by which means it was consumed, along with some of the neighbouring houses. This fire excited great commotions in the city, and Nestorius was ever afterwards called an incendiary.

From the Arians he turned his persecution against the Novatians, but was checked in his career by the interposition of the emperor. He then let loose his fury upon those Christians of Asia, Lydia, and Caria, who celebrated

the feast of Easter upon the fourteenth day of the moon; and for this unimportant deviation from the Catholic practice, many of these people were murdered by his agents, both at Miletum and Sardis. One can scarcely regret that such a relentless persecutor should himself have been afterwards condemned as a heretic, for holding an opinion which no man out of the church of Rome will now venture to controvert. The obnoxious tenet which produced a schism in the church, and was condemned by a general council, consisted in maintaining that the Virgin Mary cannot with propriety be called the mother of God. The people being accustomed to hear this expression, were much inflamed against their bishop, imagining that he had revived the error of Paul of Samosata and Photinus, who taught that Jesus Christ was a mere man. The monks declared openly against him, and, along with some of the most considerable men of Constantinople, separated themselves from his communion. Several bishops wrote to him, earnestly urging him to acknowledge that Mary was the mother of God; and when he refused to comply, they procured his condemnation in the council of Ephesus, which deprived him of his see. He then withdrew to his former retreat at Antioch, whence, four years afterwards, he was removed by the emperor's order, and in 435 banished to Tarsus; and when that city was taken and destroyed by the barbarians, he was transferred to Panopolis, a city of Thebais. But he was not suffered to remain long there, and being compelled to wander from place to place, having received a severe bruise in one of his journeys, death soon relieved him from the rage of his persecutors.

If we examine such of his writings as remain, we shall find that he was unjustly condemned. It appears that he rejected the errors of Ebion, Paul of Samosata, and Photinus; that he maintained in express terms, that the Divine Word was united to the human nature in Jesus Christ in the most strict and intimate sense possible; that these two natures, in this state of hypostatical union, make but one Christ and one person; that the properties of the divine and human natures may both be attributed to this person; and that Jesus Christ may be said to have been born of a virgin, to have suffered and died. But he would never admit that God could be said to have been born, to have suffered, or to have died.

NET, a device for catching fishes and fowls. The taking of fowls by means of nets is the readiest and most advantageous method, where numbers are to be caught. The making of the nets is very easy, and what every true sportsman ought to do for himself. All the necessary tools are, wooden needles, of which there should be several of different sizes, some round, and others flat; a pair of round pointed and flat scissors; and a wheel to wind off the thread. The pack-thread should be of different strength and thickness, according to the sort of birds to be taken; and the general size of the meshes, if not for very small birds, should be two inches from point to point. The nets should neither be made too deep nor too long, for they are then difficult to manage; and they must be verged on each side with twisted thread. The natural colour of the thread is too bright and pale, and it should therefore in many cases be altered. The most usual colour is the russet, which is to be obtained by plunging the net, after it is made, into a tanner's pit, and letting it lie there till it be sufficiently tinged. This is of a double service to the net, since it preserves the thread as well as alters the colour. The green colour is given by chopping some green wheat and boiling it in water, and then soaking the net in this green tincture. The yellow colour is given in the same manner, with a decoction of celandine, which gives a pale straw-colour, like that of stubble in the harvest-time. The colour of the nets should be adapted to the ground upon which they are spread. See RETICULATION.

NETHERLANDS.

Nether-
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IN the article HOLLAND has been traced the history of the revolt of the seventeen provinces of the Netherlands against the Spanish monarchy, and the subjugation of the greater part of ten provinces to that power in the year 1578, whilst the remaining seven provinces, under the Prince of Orange, maintained and ultimately secured their independence in a republican form. Whilst this work has been in progress, a change has been effected in the Netherlands, terminating in a division which renders it necessary to introduce here an account of the new kingdom of Belgium; the name which has been assumed by the southern part of what was formerly the kingdom of the Netherlands.

The decisive battle of Gemblours, on the 31st of January 1578, which terminated in favour of the Spaniards, and in the dispersion of the army of the states, with the loss of all its artillery, baggage, and stores, must be viewed as the event by which the history of the Netherlands is separated from that of the seven united provinces, which were collectively called Holland, after the first of these states. The archduke, better known by the name of Don Juan, having gained this victory, was suddenly arrested by the hand of death whilst following up his success; and his death has generally, but on insufficient evidence, been attributed to the effects of poison. He was immediately succeeded by the Prince Alexander Farnese, the son of the Duke of Parma and Piacenza, in Italy, by Margaret of Austria, a daughter of the Emperor Charles V., who had formerly governed the Low Countries under the authority of Philip king of Spain. On his accession to the command, the provinces were in a most unsettled state. Don Juan had feared to attack the partisans of the Prince of Orange, who held possession of Brussels; but he was successful in seizing upon Tirlemont, Louvain, Bovines, Philippeville, and several other smaller but fortified places. These successes were, however, more than counterbalanced by the loss of Amsterdam, where the inhabitants rose on the Spanish garrison, and, having succeeded in driving out the troops, boldly declared in favour of the Prince of Orange. The great strength of the Spanish party in the ten provinces depended more on their union under one chief, and on the discipline of the few regular troops whom they had been able to collect, than on the number of soldiers or the abundance of pecuniary resources. The people of the Walloon provinces were bigotedly attached to the church of Rome, and were ready to give up their whole civil rights rather than abandon an iota of that faith, or a single religious observance to which they had been accustomed. These constituted the chief reliance of the Spanish monarch; and under obedience to him had remained, or returned, the fortified towns on the frontier towards France, such as Lisle, Valenciennes, Courtray, and several others. In the party opposed to the Spaniards, though there was a greater number of the population, and a far greater power in warlike stores and in pecuniary resources, yet there were such party divisions and contests, and such struggles for power between chiefs, as tended much to weaken the effect of their efforts to drive out the Spaniards, or even to maintain against them the power which they still held in Brussels, and in the commercial and maritime cities.

Although the Prince of Orange, by his talents and his virtues, was at the head of the general confederacy, and, after the independence of the seven provinces had been secured, clothed with unqualified authority within them; yet in the transactions of the ten provinces, which were

to be the chief theatre of future warfare, faction had raised up powerful rivals, who impeded his wisest plans. Amongst those of his party who still adhered to the Catholic faith, and were anxious to preserve it, without yielding up to Spain the civil privileges they had long enjoyed, was the Duke of Arschot, the head of a powerful family, who strove to awaken the jealousy of the aristocracy of Flanders and Brabant against the power which the seven northern provinces had bestowed on William of Orange. In order to counterbalance that power, they resolved upon sending an invitation to the Archduke Mathias, the brother of the Emperor Rudolf II., a youth under twenty years of age, to accept the office of governor of Flanders. A secret messenger was despatched to Vienna, and communicated with the archduke, who, with the precipitation of youth, ardently accepted the offer; withdrew privately from Vienna without imparting his project to his brother; and with great celerity and secrecy arrived at Maestricht without previously having announced his resolution, which was scarcely expected by the party that had invited him, and quite unexpected by the Prince of Orange and his friends.

That prince, with his usual coolness and prudence, expressed neither surprise nor dissatisfaction at this unwarrantable intrigue against his authority; but, on the contrary, he became, or appeared to become, anxious for adopting any measures which could do honour to Mathias, and at the same time increase the security of the country. He framed the outline of the plan upon which his office was to be founded and the power granted to him, but so much under the virtual sovereignty of the states-general, as to leave little to the thoughtless youth but the empty title by which he had been tempted to make this wild excursion. The Prince of Orange was appointed his lieutenant in the several civil and military departments of the government, and the Duke of Arschot was left, with little power and less influence, to brood over the disappointment of his ambitious scheme. As his power was but of small extent, he soon resigned it with good humour; and the states, who had only adopted him in the hope of thereby obtaining foreign assistance, when they found he was not supported by his brother or by the empire, accepted his resignation, and dismissed him with an unanimous vote of thanks for his services. After some difficulty, Mathias was allowed by his brother to return to the Austrian dominions, and was promoted to the government of the hereditary provinces, and intrusted with the command of an army in Hungary against the Turks, by which he acquired much reputation, and ultimately succeeded, after much intrigue and dissension, to the imperial throne, which he filled till his death in 1619. His history belongs rather to that of Austria than to that of the Netherlands.

The Prince of Orange had been regularly installed in the dignity of chief of the seven united provinces, in which he was confirmed by a treaty entered into by the states of Flanders and Brabant, who, in an assembly at Brussels, had agreed to confer on the then Duke of Alençon, afterwards Duke of Anjou, the brother of the king of France, the dignity of Duke of Brabant, Lothier, Limbourg, and Guelders. At this period the Duke of Parma collected an army in order to take the city of Cambray; but the siege, which he carried on in person, was raised by the opportune arrival of the Duke of Anjou at the head of a large army of French troops. After the retreat of the Spaniards from before Cambray, the Duke of Parma marched to Tournay, a large city, though at that time feebly garrisoned. The inhabitants, mostly Protestants, made a powerful defence, ex-

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cited by the example of the Princess of Epinol, wife of the absent governor. This heroic lady, though wounded in the attack, fought in the breach, sword in hand; and, when it was impossible to continue the resistance, she obtained an honourable capitulation, and marched out at the head of the garrison, with the appearance of a triumph rather than that of a defeat.

The Duke of Anjou, after the delivery of Cambray, leaving his army on the frontiers of Flanders, repaired to England, in the hope of completing a treaty which had before been commenced for his marriage with Queen Elizabeth. That sovereign allowed him for some time to indulge hopes of succeeding in his suit; and, from political motives, when the offer was finally rejected, showed him every mark of feeling and regret, accompanied with such tokens of high respect as she supposed would lessen the mortification which he felt. His plan evidently was to unite on his own head the crowns of England and of Belgium.

The duke, escorted by a powerful English fleet, repaired to Antwerp, where he was received by the Prince of Orange with the greatest splendour, and invested with the insignia of the dignities to which he had been invited, but of which he proved himself utterly unworthy. It is related of him, that when the Prince of Orange placed the ducal mantle on his shoulder, Anjou said to him, "Fasten it so well, prince, that they may not be able to take it off again."

The king of Spain had about this period issued a paper full of invective, abuse, and falsehoods against the Prince of Orange, who was therein proscribed, and all persons invited "to assail him in his fortune, person, and life, as an enemy to human nature;" and for the recompense of virtue and the punishment of vice, he promised, to any one who should deliver up William of Nassau, dead or alive, the sum of 25,000 golden ducats, in lands or money, at his choice; to grant a free pardon to such person for all former offences, of whatever kind; and to invest him with letters-patent of nobility. To this infamous paper William replied by that Apology which Voltaire has described as "one of the noblest monuments of history," in which he delivered a most splendid refutation of every charge against him, and a more terrible recrimination against the guilty tyrant. He thus stood before the whole public of Europe, not as a rebellious subject, but as the accuser of a king, who had disgraced his ancestors and his throne.

The inauguration of the Duke of Anjou at Antwerp gave occasion to continued festivities, and the opportunity was seized in order to put in practice that which the declaration of King Philip had intimated, and promised to reward. After a dinner on the Duke of Anjou's birth-day, being the 18th of March, and as William was quitting the dining-room on the way to his private apartment, a young man stepped forward to offer what purported to be a petition. Whilst he read the paper, the treacherous suppliant discharged a pistol at his head; the ball struck him under the left ear, and passed out at the right cheek. As he tottered and fell, the assassin drew forth a poniard to complete his crime by suicide, but he was instantly put to death by the attendant guards.

Papers found upon the assassin proved him to be a Spaniard, a native of Bilboa, and clerk to a Spanish merchant of Antwerp. They showed that he had received the sacrament and confessed previous to the attempt, and that he was encouraged to the deed by prayers found amongst his papers in the Spanish language, one of them addressed to the angel Gabriel, imploring his intercession with God and the Virgin to aid him in the completion of his object. This young fanatic was shown afterwards to have been instigated to the crime by his master and a Dominican monk, who were tried, and, before their execution, made a full confession of their criminality. It is asserted by D'Ewes, that the Jesuits, some years afterwards, solemnly gathered

Nether-
lands.

the remains of the three pretended martyrs, and exhibited them as holy relics for public veneration.

Severe as was the wound inflicted on the prince, it did not prove fatal; but within three months he had so far recovered as to be able to accompany the Duke of Anjou to Ghent, Bruges, and the other great towns of Flanders, in each of which the same ceremony of inauguration was performed. On each occasion he had taken the prescribed oaths to maintain and preserve to the states-general the several rights and privileges they had inherited from the succession of princes who had for a long period governed the country. The duke soon began to compare the power he possessed with that held by the unlimited monarchs of the rest of Europe. He was found to be intemperate, inconstant, and utterly unprincipled; and the French officers who surrounded him, and alone enjoyed his confidence, had no great difficulty, whilst nourishing his discontent at his limited power, in exciting him to take the most treacherous steps to extend his own authority, and to extinguish the liberties of the people which he had been invited to defend, and had sworn to maintain.

Amongst these privileges, that of refusing to admit foreign troops to garrison the fortified towns was the one which those towns most zealously exercised. Though the smaller towns had overlooked slight infractions of this privilege, yet the larger ones, especially Antwerp, most sedulously preserved it. Whilst a few of Anjou's troops were admitted into some places, the main body was either encamped or cantoned in quarters in the villages.

He had secretly resolved on seizing on the towns, and sent orders to his officers to take possession in his name of Dunkirk, Bruges, Termonde, and some other places, reserving to himself the attempt to be made upon Antwerp. To prepare for the execution of his project, he had ordered his numerous army, composed chiefly of French and Swiss, to approach the city, and form a camp very near to it. On the 17th of January 1583, having risen earlier than usual, under the pretext of going out afterwards to review his army in the camp, he set out at noon, accompanied by his guard of 200 horse; and when he had reached the second drawbridge, one of his officers gave the preconcerted signal for an attack on the Flemish guard, by pretending that he had fallen and broken his leg. The duke called out to his followers, "Courage, courage; the town is ours." The guard of Flemings at the gate was soon despatched; and the French troops, which waited without to the number of 3000, rushed in furiously, shouting the war-cry, "Town taken, town taken; kill, kill!" The astonished but intrepid citizens, recovering from their confusion, instantly flew to arms. All differences in religion and politics were forgotten in the common danger to their freedom. Catholics and Protestants, men and women, rushed alike to the conflict. The ancient spirit of Flanders seemed to animate all. Workmen, armed only with the instruments of their various trades, started from their shops, and flung themselves on the enemy. Those who had fire-arms, after expending their bullets, took from their pockets and pouches pieces of money, which they bent between their teeth, and used for charging their arquebuses. The French were driven successively from the streets and ramparts; and the cannons planted on the latter were immediately turned against the reinforcements which attempted to enter the town. The French were beaten everywhere; the Duke of Anjou saved himself by flight, and reached Termonde after the perilous exploit of passing through a large tract of inundated country. His loss in this atrocious enterprise amounted to 1500, whilst that of the citizens did not exceed eighty men. The attempts of the same kind simultaneously made at Dunkirk and at Termonde succeeded, but they failed in all the other places.

The consternation first, and soon afterwards the indig-

Nether-
lands.

nation, of the whole of Belgium, excited by this act of treachery, is indescribable; but the Prince of Orange alone was cool and collected, and on the Duke of Anjou making abundance of professions of his repentance, of his submission, and of future fidelity and obedience to the states, he was disposed to some kind of reconciliation, especially as his brother the king of France despatched a special envoy to intercede for him. A treaty was then commenced, the tendency of which was to restore to Anjou the command of the troops, with some new security against treachery on his part. He had in the mean time withdrawn to France to escape the general burst of indignation, and there his worthless existence was suddenly terminated, as some thought by poison, which in that day was commonly supposed to be the cause of unexpected death. He had then scarcely attained his twenty-ninth year.

The conduct of the Prince of Orange in trying to reconcile the states to the re-assumption of command by Anjou, although it could not arise from any selfish views, since he might himself have easily obtained the supreme power, was misunderstood by many of the Belgians, but more especially by the people of Antwerp. Unable to comprehend the greatness of his mind, they openly accused him of having joined with the French for their subjugation, and concealed a body of that detested nation in the citadel. The populace rushed to the place, and having minutely examined it, were convinced of their own folly and the prince's innocence. He scorned to demand their punishment for such an outrageous calumny, but he was not the less afflicted at it. He took the resolution of quitting Flanders; and he retired into Zealand, where he was better known, and consequently more trusted.

The cities of Belgium which were free from the domination of Spain were all more or less subject to the most violent political agitations, the bad effects of which were not lightened, but rather increased, by being mixed up with the prevailing religious differences of the times. The evils of this state of public feeling displayed themselves more extensively, and during a longer period, in the city of Ghent, the capital of the province of West Flanders, than in any other part of the Netherlands. The persecutions of the Spaniards had driven the Flemings to a state of frenzy, which destroyed the exercise of reflection. Hatred to Spain begat hatred to that which Spain most cherished, the Catholic religion; and it is not to be wondered that the lower classes in the cities should, from passion rather than from reason, have taken part with those more intelligent persons who had embraced the Protestant religion; and it must be added, that the persons who envied the property of the convents and churches, and who were anxious to seize upon that wealth and convert it to their own use, vastly augmented the adherents of the Protestant party. In Ghent, two men had taken advantage of these circumstances, and thereby gained an unbounded and most noxious ascendancy over the public mind. John de Hembise is described by Vandervynkt as a man descended from a junior branch of a good family, educated, fluent and even eloquent, and well informed on every subject relating to his own country; but, on the other hand, a sceptic, destitute of morals, capable of assuming any character either sacred or profane, impatient of all control, and treating with contempt all who were in superior stations. Besides these qualities, his history shows that he was bold, despotic, and imperious in prosperity, but did not exhibit the same courage in adversity. The other, Francis de Kethule, lord of Ryhove, was also of a distinguished family, but of a character similar to Hembise, only much more violent and imprudent; but those qualities were somewhat checked by his adherence to the Prince of Orange, whose calm wisdom exercised at times some influence on his conduct.

Nether-
lands.

These two men, with all the qualifications necessary for demagogues, were allied with many of the respectable families of the city, amongst whom they gained some partisans; but their chief adherents were furnished in part by the burghers, and by almost all the mere populace. Though afterwards they differed, at first they acted in concert; and as they most vehemently preached nothing but liberty, they were soon regarded by the populace as the heroes and the liberators of their country. The Duke of Arschot had been appointed governor of the city, with the approbation of the Prince of Orange; and, though opposed by both the demagogues, he was seated in the dignity. He had drawn to him as a council the Bishops of Bruges and Ypres, the high bailiffs of Ghent and Courtray, and the governor of Oudenarde, and other eminent magistrates. Whilst they were assembled in council, the popular leaders collected a force of the lower classes, and, without even allowing him to dress himself, led him away to prison. They then seized the arsenal, armed the population, and soon had under their command a body of 20,000 well-armed and resolute men. The constitution of the city was changed, and the public treasury was seized upon, by the new rulers, who assumed the title of consuls; Ryhove being placed in the command of the military, and Hembise at the head of the civil power. The two consuls then nominated eighteen of their own partisans, to whom was intrusted the supreme power of what they denominated the republic. The several guilds were ordered to elect officers, amongst whom the ranks of colonels, captains, and other grades, were distributed; and the more wealthy and respectable inhabitants were excluded from any participation in power. The influence of the other states of Belgium, headed by the Prince of Orange, was ineffectual in checking the violent proceedings of the city, further than in procuring the release of the imprisoned duke. The two heads of the democracy fortified the city, and thus gave employment to the poor, and extracted from the rich the means of paying them. The rich abbies and other religious houses were plundered, the occupiers turned out destitute, and the buildings converted into barracks for the troops and labourers. Whilst one of the consuls ruled in the city, the other issued forth with detachments of troops, laid waste the surrounding country, and subjected several of the towns in the vicinity to the horrid despotism exercised in the name of liberty. When any persons were known or suspected to be averse to the system of terror, if they were rich they were amerced in very heavy sums, or, if not able to furnish the requisitions, were, without trial, exiled, and in some instances put to death in secret. These calamities were so deeply felt that many of the gentry and burghers became voluntary exiles, and removed to France, to Holland, or to Brabant, so that when thus left only to the demagogues and the democrats, they found they had put in movement a machine which they could neither direct nor stop. When the people became tired of anarchy, and sick of the sufferings they had caused and endured, the Prince of Orange determined to proceed to Ghent. Hembise did all in his power, by his harangues to the populace, to prevent his admission; but with the venality of such assemblages his eloquence now failed. He was seized with a cowardly panic, and attempted to withdraw privately by night. He had entered a boat to descend the river, when one of his partisans recognised him, and exclaimed, "Point de fuite; tu nous as mené dans le bournier; il faut nous en tirer, ou périr avec nous." He then made him land from the boat, and followed him to the city, where he remained in private, employed without success in exciting tumults, whilst the prince was in the city.

William of Orange reached Ghent in August 1579, and in a short time extinguished the spirit of democracy; but

Nether-
lands.

though he restored the ancient constitution, and re-established some of the ancient magistracy, he could not restore the wealth and the industry that had been destroyed or dissipated under the reign of democratic terror. Hem-bise retired from the city for four years; and, though it is anticipating the course of our narrative, it may be stated here, that, having again acquired a degree of influence, he made use of it to betray the city into the hands of the Spaniards, his mortal enemy to whom had been the original cause of his popularity. But he failed in his purpose. His designs were detected and exposed; his partisans abandoned him; and he was carried before the criminal tribunal, where, having defended himself very feebly, he was condemned to death. The sentence of decapitation was executed on the 4th of August 1584. His coadjutor Ryhove had before withdrawn from Flanders, and found an asylum in Holland, where, after a long illness, which terminated in fixed insanity, he died.

The transactions which have been noticed with regard to the Archduke Mathias, the Duke of Anjou, and the demagogues of Ghent, were the principal causes that led to the submission of the ten provinces of the Netherlands to the crown of Spain. Others, however, contributed in a greater or less degree to the same result. The differences between the Catholics and their opponents pervaded every one of the towns; and as the respective parties preponderated in any one place, they had no hesitation in persecuting the others. It was of little avail that the states had issued a law called that of the peace of religion, by which, in places where there were a hundred families and upwards of either faith, they should be allowed the public exercise of their worship; and in the smaller places the majority should have the churches, but the minority might open others. This might have tended to peace, if not to union; but, to the great mortification of the Prince of Orange, the clergy of both parties, by their influence over their followers, rendered the edict inoperative, and seem to have increased rather than abated the animosity. In Holland and in Zealand, however, there was a greater degree of religious tranquillity than in the southern provinces.

These troubles paved the way to the submission or conquest of the greater part of the ten provinces. This was the more easily effected, because the people, wearied out with their sufferings, had learned that security to their persons and their property was of far greater benefit to them than any of those kinds of liberty which the several adverse parties pretended to bestow on them. The assassination of the Prince of Orange in 1584, though not contrived by the Prince of Parma, but at the court of Madrid, was communicated to that commander before its perpetration, and he prepared the measures to be adopted when the iniquitous design should have been consummated. In the consternation produced by that event, those parts of Belgium which were free from the Spanish dominion sent their representatives to Antwerp, where they were joined by others from the Dutch states. In this assembly it was resolved to offer the sovereignty of the whole to the king of France; and ambassadors were immediately despatched to Paris. The king, Henry III., received them with great distinction; but his affairs were so much embarrassed with his internal disorders that he found himself unable to tender any effectual aid to the Netherlands. On the termination of this embassy, another was despatched to England to make a similar tender of the sovereignty to Queen Elizabeth. She civilly declined to accept the supreme power thus offered, but agreed to treat them as allies, and to send to their aid an army of 6000 men, and large pecuniary supplies. This was instantly performed; and her favourite, the Earl of Leicester, repaired to Holland, where the towns of Flushing, the Brett, and the fortress of Rammekens,

Nether-
lands.

were delivered up to him as securities. As that force only entered Holland, the conduct and the operations of it belong rather to the history of Holland than to that of those parts of the Netherlands which were soon afterwards wholly separated from it, and to which we here direct our attention.

Whilst these negotiations were in progress, the Prince of Parma on his side was active and acute, and contrived to enter into treaties with some of the leading inhabitants of those cities in Flanders which had hitherto resisted the Spanish dominion. By various measures, applied in various ways, he obtained possession, first of Ypres, and afterwards of Bruges and some other places, by which he was enabled to cut off the supply of stores and provisions from Ghent. He then formed a camp sufficiently near to complete the blockade. Scarcity soon appeared, and was followed by almost absolute famine. Agitations and factions reigned in the city; yet, by flattering reports of succours expected, the orators of the populace were for a time enabled to delay surrendering. But at length a capitulation was agreed to in September 1584. The terms were, that in future the Catholic worship alone should be performed, and no other be tolerated; that all who chose to do so should be allowed two years to dispose of their property and to leave the city; that the clergy should be established in their property as before the troubles, and the city should pay as a contribution the sum of two hundred thousand florins, and allot quarters to the troops. A few of the most violent of the partisans were excepted from the general indemnity. At first the number of exceptions were limited to six, and then reduced to three; but these persons were, after an imprisonment of a few weeks, liberated, and allowed to depart from the city.

During the operations against Ghent, the Prince of Parma had begun his preparations for the most important of all his military designs, the capture of Antwerp. With this view his army was gradually drawn around it, and a camp formed at Bevern, near the city. As a part of the preparation for this object, it was necessary to menace the large cities of the province of Brabant which still repudiated the Spanish power, such as Brussels and Mechlin, and to seize upon those which were less formidable. Parma took first Vilvorde, and then Willebrocke; and the capture of these places soon caused scarcity to be felt in the cities. Brabant, now so well cultivated and fertile, had suffered most severely during the troubles; and, for some months after the last harvest, whatever could be obtained was conveyed to the city of Antwerp, to provide against the impending siege by the one party, or to furnish the army destined to attack it by the other. Brussels first felt the misery of famine, and the interception of a convoy destined to supply its wants raised the discontent of the inhabitants to such a height, that Temple, an English officer in command of the garrison, and the civil governor, were obliged to send deputies to the camp of the Prince of Parma to treat for the surrender. A capitulation was signed on the 10th of March 1585, the garrison retired, and the inhabitants submitted to Spain. The same causes produced the same effects a few weeks afterwards in the city of Mechlin and the smaller fortified town of Brabant; and thus, Maestricht having been captured five years before, the whole of the ten southern provinces of the Netherlands, except the city of Antwerp, were subjected, after a most vehement struggle of twenty years' duration, to their former cruel and intolerant sovereign.

As the siege and capture of Antwerp was in its day considered as the most important military occurrence of the age, the history of its progress merits a detailed notice. The city of Antwerp stands upon the right bank of the river Scheldt. The stream is deep and the tides are rapid, so that the largest vessels could approach its banks.

Nether-
lands.

Below the city the river divides into several large branches or arms, and thus forms the islands which compose the province of Zeeland, by which there are safe communications by water with the several towns of that province, which was then in the possession of the Dutch. These towns were filled with seamen, and they were in possession of powerful naval armaments, and of arsenals where other vessels could be equipped with facility. They also contained abundance of storehouses filled with all the implements of war, and others provided with necessary articles for subsistence, such as were indispensable in a large city when in a state of siege. The mouth of this river on both sides was commanded by powerful forts in the hands of the friends of the defenders of the city, but which at the commencement of the siege were taken by the assailants. By the possession of Ghent, which the Spaniards had gained soon after the commencement of the siege, and of the other strong places near the upper part of the river, no means of relieving the besieged could be drawn from that quarter; but supplies, which were conveyed by the Scheldt from Friesland, forbade the expectation that by means of famine the city could ever be compelled to surrender. The extent of the works surrounding the city, the strength of the citadel that commanded it, the number of men under arms within it, and especially the tried courage, skill, and inflexibility of the commander, whom Prince Maurice of Orange, the successor of the assassinated prince, had recommended, rendered inoperative all the efforts on land to reduce the place.

The commander was Philippe de Marnix, lord of St Aldegonde, and generally known by that name; he was the intimate confidant of William, and one of those who opened the first scene of the opposition to the tyrannical measures of the king of Spain.

The Duke of Parma soon saw that, in spite of the forts which he had erected on the banks of the river, the vessels from Friesland, laden with provisions, could with little risk, when favoured by the rapid tide and a good breeze, pass to the city and return with very little or no injury. He then conceived and planned the execution of a bridge over the stream, at a bend of the river near to Lillo and Liefenschoeck; and thus, by shutting up the passage, hoped to reduce the city by famine. At the spot selected, the breadth of the stream is 2400 feet, or about half a mile. The execution of this work was intrusted to a celebrated Italian engineer named Barroccio, who had been sent by King Philip for the purpose, as soon as the project of the duke had been communicated to him; a man well calculated to carry into effect the great project which Parma had originally formed in his own mind, without intimation from any of the general officers, many of whom opposed his views, as being impracticable. The first steps were the erecting of two strong forts on the opposite sides of the river, and then throwing forward two piers from each side, which were to correspond in the middle when half the waterway was closed. The piers were formed of stakes driven firmly into the bed of the river, and rested on hard sand below the mud; and they were cemented with masses of earth and stones, and, when at a proper height, were covered with planks, and defended by parapets, on which cannon were mounted.

The vacancy between the termination of the two piers was filled up by a bridge of boats fastened together by chains, and secured by anchors. They were thus moored so as to yield to the rising and falling of the tide, and were armed with a great number of cannon. For the construction of this work, almost all the labour of the country was put in requisition. Carpenters, shipwrights, smiths, and even masons, were all compelled to work at this erection; whilst great numbers of other men were employed in cutting down the trees in the neighbouring district of Waaslande to furnish materials. Heavy contributions

were extorted from every part under the Spanish authority; and thus, as neither money nor labour was spared, a few months were sufficient to complete the bridge, which was twelve feet in breadth, so that eight men could march abreast, and were under the protection of wooden bulwarks, which were musket-proof.

But the work was not suffered to proceed without some interruptions. The Antwerpers burned some and captured others of the boats on which the bridge was to be erected, and many vessels succeeded in forcing their passage through the unfinished bridge, and conveyed cargoes of provisions to the besieged. Some of these, however, being captured, orders were issued in Zeeland that no single ship should attempt to force a passage, but should wait till a fleet had been collected, to proceed in concert. By way of creating a diversion in favour of the besieged, an attempt was made by the Frieslanders under Prince Hohenlohe to seize the city of Bois-le-Duc, then garrisoned by Spaniards; but though at first successful, the ultimate issue was a repulse, with considerable loss of life to the Frieslanders.

The approach of winter caused the Spaniards some apprehension for the fate of their yet unfinished work, and for a time totally suspended it; and when the frost broke up, some fears were entertained that the great masses of ice brought down from the upper part of the river might carry away the works by their weight; but fortunately the larger bodies of ice grounded near the piles, and melting there, caused little or no damage. When the ice had thus been removed, the work was completed, and the entrance closed. Other contrivances were adopted to impede the passage of ships, especially some rafts, composed of thirty vessels loaded with ballast, and armed with sharp iron points to entangle vessels attempting to ascend.

This prodigious work, which required six months to complete, so securely barred the entrance of provisions and stores from Zeeland, that the destruction of it required the most sedulous exertions of the besieged; and efforts were immediately commenced to effect that object. An Italian by birth, but who had been long established in Antwerp, named Giambelli, had intrusted to him the construction of the engines to destroy the bridge, and to open a passage for a fleet loaded with provisions which had been prepared in Zeeland.

The consternation excited in Antwerp at the prospect of the completion of the bridge was so great, that when known it was considered as the operation of the Evil Spirit; but that view soon gave way to a firm resolution to counteract this work of the demons. Giambelli, being skilful as a fire-worker as well as an engineer, determined, by means of explosion and mining, to destroy the bridge. To effect his purpose, he required three of the largest ships lying at Antwerp to be used as mines, and sixty smaller and flat-bottomed vessels to be converted into fire-ships; but motives of economy had such weight with the inhabitants, that he was compelled to contract the plan of his operations. He could only prevail on the council to give him two ships, and those of small size, and thirty-two flat-bottomed barges. The mining-ships had a magazine built of masonry three feet in height, the same in breadth, and sixty feet in length, to be filled with gunpowder. It was covered with a roof formed of mill and other hard stones, six feet in thickness, that by its weight the explosion should take effect in a sideway direction. These mines were charged with between six and seven thousand pounds of the finest gunpowder, and between it and the roof was laid a vast quantity of stones, iron bars, and all such other pieces of iron as could be most easily got together. Through a hole in the mine, a due quantity of match to ignite it was introduced. The whole was on the outside so finished as to have the appearance of only a

Nether-
lands.

Nether-
lands.

common fire-ship. The interior of the mining-ships were furnished with mechanical clock-work, by which, when the hand reached a certain point, it would move a spring connected with a musket-lock, by which the match would kindle, and the explosion would be produced. The flat-bottomed vessels were filled with combustibles to act as fire-ships, as the destruction of the bridge was to depend on the mines; but these were thought necessary to hide the main design of destroying the bridge by the floating volcanoes, and to attract the attention of the enemy's artillery whilst the volcanoes were getting to their proper station. This formidable fleet, on the 4th of April, at the close of the day, departed from Antwerp, at the moment of the first reflux of the tide. First proceeded a small fire-boat, then the thirty-two fire-ships, in four tiers of eight each, fastened together with chains. The two floating-mines closed the squadron. The direction of the vessels was intrusted to a number of boats, well manned with rowers, by which means the whole was brought into and kept in the middle of the stream.

The report of some great intended effort of the besieged had been spread in the Spanish army, and proper measures of watchfulness were adopted, by strengthening the guards on the forts, on the banks of the river, and on the bridge, so that, at the first appearance of the squadron, each corps was at its proper post, waiting tranquilly the approach of the enemy. The outposts on the river first observed the fire-boat in flames, and then the others appeared with their burning fires, hiding the mining vessels in their rear. Every man was quickly in motion. The whole bridge, from one end to the other, was crowded with troops, as well as the forts at each end of it, and the batteries on both shores; and each gunner stood with his linstock ready to discharge the cannon. The Duke of Parma was himself present giving his orders, and observing the astonishing spectacle. Not only the combustibles in the vessels, but the vessels themselves, appeared to be in flames. The stream was illuminated, and the bank blazed with the reflection. The squadron had approached to within two thousand feet of the bridge, when the preparation of the mines was completed, and the boats that had towed them cut off and removed to a distance to wait the expected explosion. The squadron, thus too early left to the sole direction of the tide, was drifted in different directions. Some of the fire-ships got on shoals, and there burned out without doing any mischief; the smallest of the two mines got on shore, sprung a leak, and sunk; others of the fire-ships became entangled in the floating vessels, and burnt themselves out. All danger seemed to the Spaniards to be over, and they enjoyed their jests at the expense of those who had expended so much time, labour, and money, so ineffectually. In a few minutes, however, the largest of the mining-ships descended the stream, and fell on the bridge on the Flemish side, near to where the pier terminated in the fort. The duke was standing near it, and, urged by a young officer who had been an engineer, and knew the skill of Giambelli, to retire from the spot on which he stood, he refused to do so, when the young man seized him by the cloak and pulled him away. At that moment the great magazine exploded. The report and the shock were tremendous. Even the bottom of the river was turned up by its force, and rushed with impetuosity over the banks. A concussion of the earth, resembling an earthquake, was felt over a circle of ten miles. The contents of the floating volcano, mingled with the ruins of the bridge, with shot, weapons, and the bodies of soldiers and sailors, were blown to an invisible height in the air, and in their fall were scattered over so vast an extent, that scarcely any particle of what they had been was distinguishable. The Duke of Parma with his staff-officers were thrown down senseless, and himself severely wounded by one of the beams, which was

forced between his head and his shoulders. The Marquis of Richebourg, with two other superior officers, Roubais and Billi, near him, were killed, and more than 800 soldiers perished. The casualties were produced, some by the flood, others by flames; and the fragments of their bodies were scattered far and wide.

When the duke had recovered from his fainting, he immediately gave directions to repair in some degree the damage which his works had sustained. In the night when the explosion took place, and the following day, expectation was alive, in both the opposing forces, for the appearance of the Zealand fleet, to the progress of which the remains of the bridge would have been no obstacle. By some want of combination, that fleet was detained, and the prince inspired those under his command with so much energy, that, directing their united powers to one object, they were enabled, by sinking boats and vessels in the open places, by driving piles, and by fastening chains, to oppose such powerful impediments as prevented the Zealanders from attempting to force the passage up to Antwerp.

The besieged, although thus disappointed, did not give way to despair. Giambelli prepared another floating mine, to which was given the presumptuous name of the End of the War; but this machine grounded in descending the stream, and was destroyed without producing any effect on the enemy. There was one resource left to the besieged, which was recommended by the example of the siege of Leyden, where it had been attended with success. It was that of inundating the whole country between Lillo and Stabroch, including the Spanish camp at Bevern. In order to accomplish this, it was necessary to cut through the dike or bank which defended it against the irruption of the Eastern Scheldt. The whole plain intended to be covered with water was traversed by a high and wide counter-dike, called the Dike of Couvestien; and the Duke of Parma, knowing its importance, had early taken possession of it, and had protected it by several strong forts. The garrison, aided by the Zealanders, made two spirited attacks on this series of works, in the latter of which the blood of both parties was most profusely shed. Each fought with the most desperate valour; but finally the confederates were repulsed, leaving three thousand dead upon the dike, or at its base, and the Spaniards lost more than eight hundred men. The unsuccessful issue of these several efforts had its effect on the population of Antwerp. The scarcity of provisions already felt, and the prospect of the famine which evidently impended, made some clamorous and most anxious for peace. This disposition led to negotiations for surrender, and the commander Aldegonde himself repaired to the camp of Parma to open a treaty; but the duke would not listen to the terms proposed, which required an amnesty for all past transactions, and permission to the Protestants to be allowed to follow their own religious opinions. Other negotiations followed, and, whilst they were depending, the surrender of Mechlin to the Spaniards cut off the little hope of a supply of provisions which had hitherto existed. The clamours of the inhabitants became so loud, that the council and the commander were compelled to yield: they proceeded in a body to the Spanish camp, and there, after a close siege of fourteen months' duration, a capitulation was signed on the 17th of August 1585. The terms of it were, that the city should submit itself to the king of Spain in his character of Duke of Brabant; that all past events should be forgotten; that the Catholic religion alone should be exercised, and that those of other persuasions be allowed four years to dispose of their property and withdraw; that the churches should be rebuilt at the expense of the citizens, who were also to present to the Spanish army 400,000 ducats (about L.38,000), and, as long as Holland continued in a state of hostility with Spain,

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to maintain a garrison of 2000 men. Aldegonde, the commander, was also, by the terms of the treaty, prohibited from bearing arms against Spain for one year.

The capture of Antwerp was one of those important events the consequences of which became of less weight as time advanced; but these consequences were ultimately more in favour of the vanquished than of the triumphant party. Both parties had been weakened by the long contests which had been carried on; and both had nearly exhausted their powers in the struggle, which left them in such a state that a great degree of inactivity prevailed. Spain had acquired in the ten provinces a full authority, which no exertions on their part could shake off. The united provinces had also secured their independence and self-government, and, from the nature of their country, and the adaptation thereto of their naval power, were enabled to bid defiance to any attempts made to subjugate them to the power of Spain.

At this period the warlike operations between what may be called Holland and Belgium had been suspended, because in the latter country no resources were left to the government, and no aid was sent by King Philip, who was hindered from doing so by his treasures being required to secure the acquisition he had lately made of the kingdom of Portugal, and by the expenditure he applied to the equipment of that force destined for the conquest of England which had been pompously styled the invincible armada.

Some contemporary authors have assigned another cause of Philip's withholding supplies to the Netherlands, namely, a jealousy of the Duke of Parma, which led that suspicious monarch to apprehend that, seeing Belgium to be of far greater value than his dominions in Italy, feeling his own great popularity, and observing the general hatred of the Spaniards, he might be induced to assume for himself the sovereignty.

The capture of Antwerp, though celebrated with most extraordinary demonstrations of joy in all parts of the ten provinces, was to them only the consummation of that misery and depression under which they had so long suffered. That city had been the focal point to which the commerce which enriched the country had been attracted. In the hands of the Spaniards, it was closed from the sea by the Dutch being in possession of the mouth of the river on both sides. The disputes about religion, which had distracted the two opposing parties, were quieted by the absence of the Protestant portion of the merchants and manufacturers, who carried with them what could be obtained for their fixed capital, and directed their fluctuating and scattered funds to be transmitted to the places to which they had removed. Amsterdam rose, with a rapidity hitherto unknown, to be a vast commercial place; the other towns in Holland shared in the advantage; and much of it was imported into London, Hamburg, and other foreign cities.

According to Schiller, the reconciled provinces in the interior exhibited the most deplorable spectacle. The inhabitants of the great towns had in a great measure fallen victims to the united calamities of war, pestilence, and famine. Large villages, which once contained from two to three thousand inhabitants, were absolutely abandoned to the wolves, who had become so numerous and fierce that they attacked not merely decrepit persons and children, but strong and full-grown men; the dogs, driven about by hunger, had become as ferocious as other beasts of prey, and joined in large packs in hunting down cattle and men; neither fields, nor woods, nor roads were to be distinguished by any visible boundaries; all was an entangled mass of trees, weeds, and grass; so that many who returned to take possession of their property could not find out the places where their dwellings and fields had been. The prices of the necessities of life were so high, that persons

of rank were compelled to dispose of whatever they had to buy bread, and were often so reduced as to have recourse to open beggary in the streets; whilst the poorer classes could only sustain life by food of the worst and most unhealthy description. Few marriages were contracted, few children born, and of these a great proportion were early carried off by death.

Although more properly belonging to an account of Holland, we cannot omit to remark the great contrast between that country and Belgium at this particular conjuncture. There the pecuniary contributions were extorted to a greater extent, and with equal severity. There, by the increase of their shipping, no scarcity nor any great enhancement of the prices of corn had been felt, as their supply was copiously obtained from the shores of the Baltic; and the extension of the fisheries supplied them amply with that kind of food, whilst within the dikes the rich meadows yielded abundance of butter, cheese, and pork, with some other kinds of meal. The heavy contributions for defence, as well as the means of subsistence, were almost exclusively met by the rapid increase of a profitable commerce. Their vessels sailed freely to the British kingdoms, to the Baltic ports, to Italy, and even to the harbours of their enemy, King Philip, both in Spain and in Portugal. The trade between the last-mentioned countries and their settlements in Asia and America was rather in the hands of foreigners than of natives, the Spanish houses of commerce scarcely giving more than their names to the transactions. The Hollanders partook largely of this trade; their manufactures and their cured herrings were much sought after, and gave them an enormous profit; and though the trade was pronounced contraband by the Spanish king, it could not be prevented; for, in spite of his ordonnances, it was so profitable to both parties, that Dutch ships under Hamburg or Lubeck colours were to be seen in all the ports of the Peninsula. By these and by other means the linens of Holland were to be seen in all the shops of Mexico, Brazil, and Peru, the payment for which, besides the tropical productions, brought gold and silver, coined or uncoined.

The religious dissensions of the period here referred to gave rise to that formation of national character which has since distinguished the two countries. The Belgians, in their severe sufferings, attributed them all to the part which the Protestants had taken in the first opposition to their Spanish king. This begat hatred to the reformed religion, and as their priests did not fail to impress that feeling, it was natural that augmented suffering should give it a more intense bitterness. It is not therefore wonderful that the hatred of the Belgians should have naturally grown, as it manifestly has done, to a degree of bigotry in religious matters, which could not be much lessened by the attempt made two centuries later to form the two parts into one kingdom under a Protestant prince. The Hollanders, on the other hand, gradually became as rigidly attached to the religion which they had embraced. It was naturally associated in their minds with all the privations which they had at first endured, with the victories they had afterwards gained, with the independence they had accomplished, and with the flourishing state of the commerce they had acquired. The emigrants, too, who joined them from Antwerp, Ghent, Brussels, and the other places which had capitulated under the condition that the Protestants should have time and permission to remove with their property, felt themselves to be suffering banishment for their religion, and as martyrs became more zealous in their adherence to the cause for which they had suffered. The Dutch did not, like the Belgians, proscribe the adherents of the opposite religion, but granted them permission to indulge in their own faith and ceremonies. This was, however, more owing to the indifference of the

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princes of the house of Orange on these subjects, and their views of the political and commercial benefits of toleration, than to the absence of bigotry amongst the Dutch people and their clergy. Very soon after their independence was universally acknowledged, the states showed quite as much bigotry towards the professors of the Protestant religion who differed on incomprehensible subjects with each other, as had ever been exhibited by any Catholics in behalf of the rites, ceremonies, and dogmas of their more magnificent church.

Besides the difference of character between the people of these two portions of the Netherlands, there was a great dissimilarity in their manners and domestic habits, which may be the more properly noticed here, because its operation has been continually active during the attempt made in the present day to consolidate into one body politic the two nations, and because the attempt has altogether failed.

The southern or the ten provinces had grown up to be a great commercial, manufacturing, and agricultural community. Each of these branches, acting upon the other, had created that general prosperity which naturally leads to the indulgence of hospitality, of jovial intercourse, and the enjoyment of luxuries of various kinds, according to the relative state of the parties composing the community. The fat burghers of Ghent and of Bruges, and the farmers of Flanders with their ornamented strong horses, and their bedizened spouses, with their ear-rings of silver or gold, were sometimes objects of ridicule and sometimes of envy to the other people of Europe. Though not very ready to pay taxes to their princes, they were always prepared to spend with cheerfulness on their own gratifications, and in hospitality to their friends. Even the peasantry were merry and cheerful in their village dances and their rural festivals, which some of the best artists have painted, and made visible to subsequent ages by their unperishing works. In short, if the people of Flanders were not profuse, they were not rigidly economical. Some of the profits of the different branches of industry were undoubtedly saved and added to the capital; but a considerable portion was expended in gratifying the tastes for show, conveniences, a cheering table, and good strong beer. The Northern Netherlands, at the period when the troubles began, were generally in a state of great poverty. Their trade was inconsiderable, and their rural industry chiefly confined to the dairy. The nature of the country recovered from the water, and protected by strong embankments from being again flooded, required all the labour and all the revenue that could be collected. The only way in which the population could subsist was by the practice of the most severe parsimony in their dwellings, their food, and their clothing. When the war commenced, they began to bestir themselves in the fisheries and the foreign trade. The profits of this were slow in arriving, and thus the habit of frugality was strengthened; and, when the profit did arrive, so large a portion was required for the general defence that none could prudently be devoted to purposes of luxury or splendour. Whilst extravagance was wisely forbidden, it is generally thought that hospitality disappeared. The domestic enjoyments were unsocial, and, except the practice of extreme cleanliness, little engaged the attention of the families but the saving of money. This representation of the national character of the Dutch has been generally dwelt upon with more severity than it deserves; but it was necessary in the circumstances, in which a tone was given to manners and morals, which has been more or less strictly adhered to till the present time. The emigrants who came to them from the southern division were at first compelled, by the losses they had suffered, to practise the same parsimony as the former residents. They too, therefore, at first from necessity, and at length from principle or habit, became,

equally with the others, habitually parsimonious and economical. It has been deemed proper to notice in this place the growth and difference of national character between the Dutch and the Belgians, because it will tend to throw some light on the most recent transactions which have taken place relative to those countries.

Although Parma, after the conquest of Antwerp, did all in his power to conciliate the inhabitants, and to relieve the distress to which they were reduced, he could only succeed with the Catholic portion of the population. The Protestants almost all left the country within the period allotted to them. The merchants removed to Amsterdam, and the manufacturers to Haerlem and other towns in Holland; and some of them repaired to England, and to the towns of the Hanseatic League on the Continent. Whatever projects the duke may have formed to relieve the pressure on the people under his command, they were all soon suspended in order to assist in the grand operation of King Philip to invade and conquer England by his invincible armada. Whilst that armament was preparing in Spain, and employing all the treasures of the monarchy, Parma, with no other resources but such as he could draw from the impoverished Flemings, was enabled, by his vigour, to fit out and arm a very powerful flotilla of vessels calculated for the conveyance of troops, and to man them with sailors better adapted for the stormy seas of the north than the Spaniards and Portuguese who manned the ships of the grand armada which had sailed from Lisbon. The Belgian fleet was collected in the Scheldt, and when completed found itself blockaded there by a Dutch naval force under the grand pensioner De Witt, and by the forts constructed at the mouth of the river, which were held by Zealanders. The flotilla was then ordered to ascend the river to Ghent, and from thence to be conveyed, either by old canals deepened for the occasion, or by new canals constructed on purpose, or by land carriage, to the small streams of the Lise, the Moere, and the Yperlee, which run to the ocean near Nieuport. They waited there for the arrival of the armada, whilst the ships of war which were destined to protect them were in the harbour of Dunkirk. The Hollanders, then, by a series of admirable manœuvres, under Justin de Nassau, so managed, that, with a fleet of ninety sail of temporary armed vessels, they closed up every opening to the sea from the mouth of the Scheldt to Dunkirk. When the Duke of Parma arrived at Dunkirk to embark, he discovered the impediment, and found the exertions he had made all rendered fruitless. The Spanish armada was then in the strait between Dover and Calais; the commander, the Duke of Medina Sidonia, was in difficulties, as the project was that Parma should land an army from his flotilla, and seize upon London, then without defence. Medina Sidonia's fleet had been weakened by the various and spirited attacks made on it in the passage up the British Channel, and he had lost some of his ships. Near Calais one large galleon was taken by Sir Francis Drake, and the ship of Admiral D'Ocquendo was burned; and the Spanish fleet, which could obtain no succour from the Flemings, began to feel a scarcity of provisions. It was at anchor near Calais when six fire-ships were equipped by Giambelli, the engineer who had directed the operations at Antwerp, and who was now in the service of Queen Elizabeth. These were kindled, and at two in the morning, with the wind and tide in their favour, despatched towards the Spanish fleet. The Spaniards, who had seen the infernal machines of Giambelli before Antwerp, thought these vessels were of the same description, and spread consternation around them by the cries and shouting, "The fires of Antwerp." In the terror, many of the ships cut their cables and fled before the wind, to avoid the flames of the fire-ships.

The result of the Spanish expedition belongs to the his-

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tory of that country or of England; but the efforts of preparation made in the Netherlands pressed with more weight on that country than many of their sacrifices during the war, and the consequences were longer complained of.

The wars in France between the Catholics and the Protestants engaged the attention of the Duke of Parma, and some of the Flemish troops aided the cause of the former, especially in raising the siege of Rouen. He was about to send a more considerable expedition into that country, and had proceeded as far as Arras, in the abbey of which city he died, after a short illness, on the 3d of December 1592, in the forty-fifth year of his age. After the termination of the siege of Antwerp, he had sedulously attended to the interests of the dominions retained by Spain. Agriculture was supported, and domestic manufactures were encouraged; the taxes were lightened; and in the seven years that passed between the surrender of Antwerp and the death of Parma, a visible improvement had taken place in the appearance of the country. It had been freed from civil war, and almost secured from invasion; the power of the law was so far restored as to give security to property, and thus promote industry; and, though warlike expeditions were undertaken, the troops only acted as auxiliaries, and were not maintained from the resources of Belgium, but drew their supplies from the countries in which they served.

The Duke of Parma had been intrusted by King Philip with power to name his successor, and, foreseeing his death, he had appointed the archduke, Pierre-Ernest Count of Mansfeldt, a younger son of the emperor of Germany. The army, which had been before prepared, was led by him into France, and there signalled itself by the assistance which it afforded to the party of the league. He did not return to Belgium till January 1594. During his absence domestic tranquillity prevailed, though in the interval the Dutch, who had chosen Prince Maurice to succeed William of Orange, had captured the towns within the seven united provinces which were held by Spanish garrisons. These were, Deventer, Zutphen, Groll, Breda, Nimwegen, Gertrudenburg, and Steenwyk; and they formed a powerful barrier against any attempts that could be made by the troops of Spain in Belgium.

The archduke, obtaining no remittances from Spain, made application to the states of Holland for entering into a pacific negotiation with them, and addressed his letter to the states, which, by implication, was an acknowledgment of their sovereignty. Commissioners from both parties met; but about that time the Dutch had discovered some attempts at a plot for the assassination of their stadtholder, Prince Maurice, his brother Prince Henry, the pensioner Oldenbarnevelt, the chancellor Leoninus, and the general Aldegonde. A priest of Namur having been taken disguised as a soldier, had confessed the criminal design, and named his accomplices. The suspicion excited by this discovery was strengthened by that of another project to be executed in England by a Portuguese physician against the life of Queen Elizabeth. The Dutch would not trust to Spain. The archduke was assured by them, and in most courteous terms, that they could not trust to any terms which Spain could nullify by changing their governor of the Netherlands; but they were willing to treat, and wished to be at peace with the Catholic provinces. The archduke was mortified at the rejection of his offers, and other vexations arose from the withholding pecuniary supplies by Spain, so that when the army returned from France their arrears could not be paid, and they mutinied and ravaged the province of Hainault. At the same period the news arrived that Henry IV., who had been reconciled to the church of Rome, and was peaceably seated on the throne of France, had just declared war against Spain. These troubles, with others created by his aspiring to the French sceptre, so affected the health of the arch-

duke, that after a short sickness he died at Brussels in February 1595.

He was succeeded in authority by Count Fuentes, who, as a military man of approved exertion, raised two armies, one to defend the frontier against the Dutch, and another for the purpose of invading France. On the side of Holland little was done, both parties watching each other without coming to any decisive action. On the side of France, whilst the army of that country entered Hainault, the force under Fuentes attacked the fertile episcopal state of Cambray, and after a spirited siege took the capital city. But the vice-regency of Fuentes was of short duration; for in the beginning of the next year the Archduke Albert was appointed governor, and arrived at Brussels, bringing with him the Prince of Orange, the eldest son of William the Silent, who had been carried away when Count of Beuren in 1568, and kept as a prisoner in Spain during the whole period of the glorious achievements of his father.

This archduke was the fifth son of the Emperor Maximilian II., and nephew of Philip, by whom he had been educated, and whose good opinion he had gained by his prudence and valour whilst acting as viceroy in Portugal. Philip had designed him to be the husband of his daughter Isabella, and intended to create the provinces of the Netherlands into a sovereignty under his command. He was sent, in the character of governor-general, to prepare the inhabitants for this change, by conciliating the Flemings. Albert brought with him large pecuniary supplies, which enabled him to continue the warlike operations against France under the conduct of his predecessor Fuentes. In this he was in some measure successful, as he was enabled to capture Calais, and to avoid a pitched battle with Henry IV. king of France, who commanded his army in person. Whilst engaged in these operations, he attempted to enter into some negotiations with the view to a reconciliation with the Dutch; but the latter would not trust to the sincerity of Spain. Though the Prince of Orange made some efforts, his principles were doubtful; and, from the court and country in which his mind had been formed, they objected to his visiting Holland. Civil communications took place, but no progress towards conciliation was made, and the prince continued to reside in Brussels in a state of inactivity till his death.

The attempt of the archduke to draw the Dutch into a negotiation by the instrumentality of the Prince of Orange having failed, he was induced to prepare an army of 6000 men for the invasion of Holland; but his general, Varas, was out-manœuvred by Prince Maurice, who met him at Turnhout on the 24th of January 1597, and, with very little loss on his part, obtained a most decisive victory, dispersing the Belgians, and capturing the whole of their artillery, stores, and baggage, with many prisoners. This was the last considerable battle between the armies of the two divisions of the Netherlands. The effect of this discomfiture to Belgium was serious, inasmuch as it disorganized the army and deranged the finances, whilst it increased the strength, and still more the confidence, of their opponents.

Philip of Spain, who now felt his end approaching, became desirous of putting an end to the war with France, and also of establishing a general peace. At first the negotiation comprehended the states of Holland; but, in May 1598, a peace was concluded which did not extend to them. In a few days after, a public communication was made, that the sovereignty of Burgundy and the Netherlands had been transferred from the crown of Spain to the Archduke Albert and the Infanta Isabella on their being betrothed, a ceremony which was performed by proxy on the part of the Infanta, who was still in Spain; after which he was solemnly inaugurated at Brussels on the 22d of August. He immediately departed for Spain to complete

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the marriage, and left the government of his newly-acquired dominions in the hands of his brother, the Cardinal Andrew of Austria, but placed the troops, which amounted to 22,000 men, under the command of Mendoza, a Spaniard. As the archduke travelled slowly, he was nearly six months before he reached Valencia in Spain, where the marriage was consummated, and where soon afterwards he received the intelligence of the death of King Philip, the father of his bride; but it was then nearly six months more before the archduke and archduchess arrived in the city of Brussels.

In this year Mendoza, on the pretence of invading Holland, led his army into the duchy of Cleves, and some of the neutral states in Westphalia, where the most atrocious cruelties were exercised and the most extensive devastations practised. They were, however, in some degree checked by Prince Maurice with a much inferior force, and prevented from passing the Dutch frontiers. The Germans, roused by their country being invaded, hastily mustered an army of 14,000 men, badly disciplined and equipped. Mendoza resolved to abandon his projected invasion of Holland, and encounter the advancing Germans under the Count de Lippe. In an action fought with these Germans, Mendoza was eminently successful; with the loss of a few men, he was enabled to gain a victory, by which his opponents, if not destroyed, were completely dispersed.

These transactions kindled anew the patriotic spirit of the Hollanders, which from inactivity had begun to languish, and which had also been checked by the heavy taxes imposed on them, and by the demand of Queen Elizabeth for payment of the supplies she had afforded them, accompanied with the orders for the recall of her troops.

But Prince Maurice knew how to inspire the Dutch with energy, and he obtained some auxiliary troops from other countries. He had some Germans, some Swiss sent by France, and troops both from England and Scotland, then separate kingdoms; and he collected the whole disposable force of the Dutch confederacy, amounting to about 17,000 men, whom he secretly transferred to the island of Walcheren, and having plenty of craft adapted to the purpose, he suddenly shipped them, and ascended the river Scheldt. He passed with the rapid flood-tide the city of Antwerp, and was in hopes of surprising Ghent, where he had calculated on finding a party disposed to assist him. In this, however, he was disappointed; and taking possession of some forts in the vicinity of that city and of Bruges, he advanced to Nieuport, the siege of which place he immediately commenced.

The archduke was taken by surprise, and the Spanish forces were in a state of mutiny on account of their pay being in arrear. In this crisis he acted with great decision and celerity, and in a few days was able to collect a force of 12,000 men, which assembled at Ghent. Nieuport, which Maurice was besieging, is on the sea-coast, amongst the downs or sand-hills, and in a country affording but scanty supplies. The first movement of the archduke was to cut off the retreat of the Hollanders, in which he was favoured by the occupation of Ghent and Bruges. He also determined on raising the siege of Nieuport, and recaptured all the forts which Maurice had taken, except those of Ostend. As he advanced he came in contact with a part of the army of the Dutch, consisting of 3000 men, commanded by Prince Ernest of Nassau, and composed for the most part of Scottish infantry. These were attacked, and, to give time to the main body under Maurice to form, they fought most gallantly; but, after a loss of nearly one third of their number, and being completely separated from the rest of their army, they were defeated, and at length threw themselves into Ostend. The archduke, encouraged by this success, resolved to attack Prince

Nether-
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Maurice. Most of his more experienced and cautious officers recommended that the army should remain in their position, where, by famine, they would shortly compel their opponents to surrender. Others, especially the Spanish officers, elated by their recent success, urged an immediate advance. Maurice, who had been surprised by the rapid movements of the enemy, was in a most embarrassing situation. Before him was the garrisoned town of his enemy, and behind him the main army, now more than equal to his own in numbers, as well as in courage and discipline. The sea was open to him, and such was his alarm, that he desired his brother, Prince Frederick Henry, and a young prince of Holstein, with several young English nobles, who were volunteers, to embark on board a vessel; but they all refused, and resolved to face the threatened battle; and, as Maurice could not embark his whole army on an open shore in the face of a superior force, he determined to risk an action in which he had little cause to hope for a victory. It was the resolution of despair rather than of hope. The vessels on the coast were ordered to depart and range themselves before the port of Ostend.

It has been remarked by the historians of the day, Vandervynk and Grotius (the latter of whom, then a youth of eighteen, was present), that each of the armies was of such a variety of troops as to make them respectively an epitome of the various nations of Europe. The force of Maurice consisted of Dutch, English, Scotch, Germans, French, and Swiss, under Count Louis of Nassau, Sir Francis Vere, Sir Horace Vere, and other English officers of considerable celebrity. The archduke had under his command Spaniards, Italians, Walloons, Belgians, and Irish, who were led by Mendoza, La Berlotta, and other celebrated officers. The rival generals rode along their respective lines, addressed a few words of encouragement to their men, and the contest commenced.

On the 2d of July 1600, at three o'clock, the archduke began the attack. His advanced guard, commanded by Mendoza, and composed of the mutineers, who now resolved to atone for their former misconduct, marched across the sand-hills with desperate resolution. They soon came into contact with the English part of the force under Sir Francis Vere, who was desperately wounded in the first shock. The assault was almost irresistible. The English, borne down by numbers, were forced to give way; but the main body pressed on to their support, and Sir Horace Vere stepped forward to supply the place of his brother. Not an inch of ground was gained or lost; the firing ceased, and pikes and swords crossed each other in the regular conflict of man to man. The action now became general along the whole line. The two commanders-in-chief were to be seen at all points. Nothing could exceed their mutual display of skill and courage. At length the Spanish cavalry, broken by the well-directed fire of the patriot artillery, fell back on their infantry and threw it into confusion. At the same instant the archduke was wounded by a lance in the cheek, unhorsed, and forced to quit the field. The report of his death, and the sight of his war-steed galloping alone across the field, spread alarm throughout the royalist ranks. Prince Maurice saw and seized on the critical moment. He who had so patiently maintained his position for three hours of desperate conflict, now discerned the instant for a prompt and general advance. He gave the word, and having led his troops to the charge, the victory was at length decided.

The defeat of the royalist army was in fact complete. The whole of the artillery, baggage, standards, and ammunition, fell into the hands of the conquerors. Night alone saved those who fled, and the nature of the ground prevented the cavalry from consummating the destruction of the beaten army. Accounts differ as to the actual number of the killed, some stating it at 6000 men, others at

Nether-
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3000; but perhaps the latter computation does not include the wounded. For the number of men engaged, it was the most bloody battle that had yet been fought. All agree that more than half of the men engaged on both sides were either killed or desperately wounded. The Hollanders alone made prisoners, and amongst them were many officers of the first rank. Mendoza was one of these; he had been wounded, and the prince had difficulty in saving his life from the German auxiliaries, who were desirous of revenging on him the atrocities committed by his army in the duchy of Cleves and in Westphalia. Amongst the other prisoners of eminence were the admiral of Aragon, the seneschal of Montemilard, and the generals Don Louis de Vellar, Don Idiaquez Monroy, D'Avila, and the aide-de-camps of the archduke. The archduke, furnished with a fresh horse, made his escape from the field, and reached Bruges, where he joined his wife, who had confidently expected him to return victorious, and immediately proceeded to Brussels. Although wounded, and at one time a prisoner, but rescued by his own troops, he uniformly preserved his presence of mind, and throughout gave such directions and orders as evinced the soundest judgment.

This bloody victory was of little military consequence, but the moral effect on the courage of the conquerors, and in the depression of the defeated, was of the greatest importance. Prince Maurice had escaped from a destruction that appeared almost inevitable. After the battle he resumed the siege of Nieuport; but some reinforcements had been introduced, which rendered its speedy capture impracticable, and, from want of supplies, the attempt was abandoned; and having prepared Ostend for a vigorous defence, he returned to Holland with the remains of his army. He was there received with the most rapturous congratulations by his countrymen; but amongst the more rigid of the republicans some jealousy arose, lest the successful soldier should aspire to be the sovereign of the country. This jealousy was felt by the pensionary Barnevelt, and, when extended, led to those agitations which long endured in the states, and which at a later period led to the death of that invaluable patriot; but these are transactions belonging exclusively to the history of Holland.

The archduke called together at Brussels the states of the Catholic provinces, who, when assembled, communicated their opinion, that nothing but peace would satisfy the inhabitants, or preserve the country from exhaustion and complete ruin. He could not but see the reasonableness of the view thus presented to him, and resolved to attempt a treaty. The states of Holland readily embraced the intimations made to them, and at length commissioners from both parties were nominated, and met at Bergen-op-Zoom; but their negotiations were broken off almost as soon as they had commenced. The Spanish deputies demanded that the new republicans should submit themselves to their ancient masters. But this was received by the deputies of Holland as worse than insult, and as a proof of the insincerity of those with whom it had originated, who must have known that such a proposition could never be permitted to become a subject of discussion. The parties soon separated, and during the winter that followed both made preparations for continuing the war.

Early in the spring, Maurice found himself at the head of an army of 16,000 men, composed chiefly of English and French, who, in this instance, cheerfully united and rivalled each other. He attacked the town of Rheinberg, and took it; but from before Bois-le-Duc he was obliged to retire. The whole attention of both the contending armies was drawn toward Ostend, a place of some though but little importance to either party, when put in com-

parison with the extraordinary loss of lives which the contest for its possession ultimately occasioned. The archduke, however, resolved on making the conquest of this place, and the Dutch seem to have made it a point of honour not to yield it up. The attack and the defence were carried on with equal skill, courage, and perseverance, and the operations, protracted for more than three years, kept alive the anxiety of all the military men of Europe during that period. Sir Francis Vere commanded in the place at the time of the first investment; but governors, garrisons, and besieging forces, were renewed and replaced with a rapidity which gave one of the most frightful instances of the ravages of war.

This siege became a school for the young nobility of all Europe, who repaired to the one party or the other to learn the principles and the practice of attack and defence. Every thing that the military skill of that age could devise was resorted to on either side. The slaughter in the various assaults, sorties, and bombardments, was enormous. Squadrons at sea gave a double interest to the land operations. The celebrated brothers, Frederick and Ambrose Spinola, founded their reputation on both elements. Frederick was, however, killed in one of the naval combats with the Dutch galleys, and Ambrose acquired his fame by the ultimate conquest of Ostend. As the Dutch had the superiority at sea, they could throw in renewed succours, whilst the Spaniards having full possession of the surrounding land, could bring to the besiegers whatever stores or recruits were needed. Redoubled attacks and multiplied mines at length reduced the town to a mere mass of ruins, and scarcely left to its undaunted garrison sufficient footing on which to prolong their desperate defence. Ostend at length surrendered on the 22d of September 1604, after a siege which had commenced in July 1601. The victors marched in over its crumbled walls and shattered batteries. Scarcely a vestige of the place remained beyond those terrible evidences of destruction. The ditches filled up with the rubbish of ramparts, bastions, and redoubts, left no distinct line of separation between the operations of attack and defence. It resembled a vast sepulchre rather than a ruined town, a mountain of earth and rubbish, without a single house in which the wretched remnant of the inhabitants could hide their heads.

The death of Queen Elizabeth of England happened during this siege, and some time was passed in anxious expectation of what would be the conduct of her successor, who was actuated on the one side by his high opinion of the rights of royalty, and on the other by the policy of his English ministers, and the representations of Henry IV. of France. In this case, though he threatened, he did not withdraw his troops from the Dutch; but he, at the same time, gave liberty to the Spaniards to raise recruits in England for the Belgic states.

In the year 1605, both the Dutch and the Belgians, the former under Prince Maurice, and the latter under Spinola, took the field. The prince projected the surprise of Antwerp; but the vigilance of Spinola anticipated his intention. Spinola then invaded the province of Overijssel, and took some of the smaller towns. Maurice flew to the relief of the province; and by his tactics obliged Spinola to retire to the Rhine, where he awaited at Roermond the attack of the Dutch. A battle was there fought, in which the fortune of the day more than once varied. At length Maurice desisted, and the Spaniards had the honour of the victory; but the loss on both sides was nearly equal, and few or no prisoners were taken. In the mean time, the Dutch had gained a naval victory of much importance. A squadron of ships commanded by Hautain, admiral of Zealand, attacked a superior force of Spanish vessels close to Dover, and defeated them with considerable loss. The victory was, however, sullied by an act of great barbarity;

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all the soldiers found on board the captured ships were tied two and two, and thrown into the sea. Some few extricated themselves, and by swimming reached the shore; and others were picked up by the English boats, the crews of which witnessed the scene, and hastened to the relief of the sufferers.

The military forces of the Catholic states had been abundantly supplied with pecuniary resources from the treasures of Spain. But Philip III. who had succeeded to the throne of that kingdom, found difficulties arise respecting the supplies. He wanted that economical arrangement in his finances which had been one of the peculiar features of the late king; he was embarrassed with troubles in Portugal, which showed strong dispositions to throw off the yoke of the Spanish government; and he had been prevented from drawing resources from his dominions in both the Indies, by the interruptions which the Dutch navy had caused in all parts of the world, and by the capture or destruction of some of his ships returning with the treasures of Mexico and Peru. Discontents had been created in the Catholic Netherlands, excited by suspicion of the design of Spain to place those states again under her immediate government. In one of his public rescripts, Philip had described the people of the Netherlands as *his beloved subjects*. This caused great agitation in the states, as they had imagined that the cession of the sovereignty to the archduke had made them an independent kingdom. The debts of the states had also accumulated to a large amount, and there was no prospect of discharging them as long as the war with the Hollanders should continue. Even the general, Spinola, had so encumbered himself with personal obligations to further the public service, that he gave a lead to the feeling generally entertained in favour of peace.

In this state of affairs, proposals were made by the archduke in May 1607, to enter into negotiations for a peace; and two plenipotentiaries having been despatched from Brussels, repaired to the Hague.

But public opinion in the Dutch states was much divided on this important question. An instinctive hatred against the Spaniards, and long habits of warfare, led the great mass of the people to consider any overture of peace as some wily artifice aimed at their religion and liberty. War seemed to have opened to them inexhaustible sources of wealth; whilst peace appeared to threaten the extinction of the trade, which was now as much a habit as war appeared to be a want. This reasoning was particularly convincing to Prince Maurice, whose fame, with a large portion of his authority and revenues, depended on the continuance of hostilities. It was also strongly relied on, and supported in Zeeland, and in the chief towns, which dreaded the rivalry of Antwerp. Those who bore the burden of the war saw it, however, under a different aspect. They feared that the present state of things would lead to their conquest by the enemy, or to the ruin of their liberty by the growing power of Prince Maurice; and they hoped that peace would consolidate the republic, and cause the reduction of the debt, which already amounted to twenty-six millions of florins. This party was headed by Barnevelt, whose wisdom has been established by the issue.

The wish of that great man was for a suspension of arms, in order that opposition might subside, and the interests of the contending parties might be calmly discussed; and he managed so as to gain a reluctant acquiescence to his views from the Prince of Orange and his partisans. The united provinces positively refused to admit even the commencement of a negotiation until the archduke made a distinct recognition of their independence, and an ambassador was appointed with instructions to require this important admission. Some delay was occasioned by the demand for this preliminary, and many suspicions were either

Nether-
lands.

kindled or kept alive in the united states by the dubious tone of the Belgian authorities. These were, however, at length surmounted, and the independence of the states admitted in explicit terms, upon which a suspension of arms was agreed to for eight months. During this term of suspension the negotiation had nearly been suddenly broken off by the plenipotentiary of the archduke having attempted to bribe Aarsens, the greffier of the states-general. He was a monk, named Neyen, a native of Antwerp, and had several times passed between Brussels and the Hague, and had held private interviews with Maurice and Barnevelt. He took an opportunity to present Aarsens with a diamond of great value, and a bond of the archduke for 50,000 crowns, which was accepted and communicated to Prince Maurice, who, still anxious to prevent peace, hoped the rumour of this attempt would excite distrust, and break off the negotiation. But Barnevelt obtained the diamond and bond, and in the assembly handed them to one Verreiken, who had assisted Neyen, and read him a lecture of true republican severity. Verreiken was overwhelmed with shame, and Neyen was dismissed from the embassy; but, after this delay, the negotiation proceeded, in spite of the opposition of Prince Maurice and his adherents.

The assembly of ambassadors met at the Hague in January 1608, and though the plenipotentiaries of the archduke and of the Dutch states were the principal negotiators, yet the kings of England, France, and Spain had each their ministers, who interfered in the negotiations, and thereby created various obstacles, and many delays. The main points for discussion, on which depended the decision for peace or for war, were those which concerned religion, and the demand on the part of Spain, that the united provinces should renounce all claims to the navigation of the Indian Seas. Philip required for the Catholics of the united states the free exercise of their religion; but it was opposed by the states-general, and the archduke, seeing the impossibility of carrying that point, sent his confessor Briznella to Spain. This dominican was furnished with the written opinions of several theologians, that the king might conscientiously pass over the article of religion; and he was the more successful with Philip, as his minister, the Duke of Lerma, was resolved to bring about peace at any price. The conferences at the Hague were thus little impeded, though they advanced slowly till the month of August, when it was announced that the king of Spain had abandoned the question concerning religion; but it was with the certainty that his moderation would be recompensed by ample concessions in regard to the India trade, on which he was inexorable. This article became the rock upon which the whole negotiation eventually split. The court of Spain on the one hand, and the states-general on the other, inflexibly maintained their opposing claims. The other ambassadors employed every possible expedient to shake the determination of the Dutch; but the influence of the East India Company, of the islands of Zeeland, and of the city of Amsterdam, prevailed over all. Reports of the avowal, on the part of the king of Spain, that he would never renounce his title to the sovereignty of the united provinces, unless they abandoned the Indian navigation, and granted the free exercise of religion, threw the whole diplomatic corps into confusion; and, on the 25th of August, the states-general announced to the Marquis of Spinola, and the other ambassadors, that the congress was dissolved, and all hopes of peace abandoned.

The ambassadors of England and of France did not, however, altogether despair of succeeding in bringing about tranquillity; and Barnevelt with his great influence joined them in all their efforts. The king of Spain and the archduke wished for a temporary repose, but, being

Nether-
lands.

strongly disliked by Maurice and his powerful party, they were compelled apparently to give way. A new congress having been agreed upon, was assembled at Antwerp; and the states-general removed from the Hague to Bergen-op-Zoom, to be within reach, and ready to co-operate in the negotiation. It did not appear so easy to make a peace as to effect a temporary truce; and, working in that direction, the two representatives of England and France, with the aid of Barnevelt, in opposition to Maurice, who resigned in disgust all his employments, but afterwards resumed them, succeeded in concluding a truce, which was at length signed by all parties on the 9th of April 1609. By this treaty hostilities were to cease for twelve years. The terms were vague and inconclusive in many parts; but as it was desirable to all parties, it became durable. The united states were declared free and independent. Each party was to retain the places they respectively held at the commencement of the armistice. In terms very obscure, the right to navigate the Indian Seas was granted to the Dutch. The article which respected religion was so expressed as to be differently interpreted; but it practically gave toleration to the Catholics in Holland, with some restrictions. The other articles settled points relative to boundaries, custom-houses, and some other internal matters. The treaty was guaranteed by the kings of France and England.

This treaty was received in both the divisions of the Netherlands with rapturous acclamation, and the most sincere demonstrations of joy. The northern division, during all the tempestuous visitations it had endured from hostilities, had risen to opulence, power, and weight, in the rank of European nations. Belgium was now permanently fixed under the sovereignty of the house of Austria, but still left in possession of some of those ancient privileges which had been transmitted to the people from the earlier times, when they composed part of the duchy of Burgundy. No sooner was the truce concluded, than Belgium, like the independent states, began to labour assiduously to repair the dreadful ravages caused by the long and bloody war. The success in Belgium was considerable, for the Archduke Albert, and his wife Isabella, joined to much probity of character considerable talents for government, and exercised the greatest possible degree of humanity and benevolence. The whole of their dominions began quickly to recover from the ravages of war. Agriculture and the minor branches of trade resumed some degree of activity; but the manufactures of Flanders, as far as they were of great value and objects of foreign commerce, were destroyed, as well as the capital necessary for their re-establishment. Some encouragement, however, was given to manufactures of the common kind for internal consumption, and the demand for them was increased in proportion as the soil, naturally fertile, became better cultivated, and the proprietors more enriched. As the port of Antwerp, the chief outlet for foreign trade, had been deprived of its shipping by the emigrations to Holland, and its only access to the sea was through the Dutch territory, there were few inducements, and fewer means of opening foreign trade at that place.

The tranquil course of prosperity in Belgium was only once interrupted during the whole twelve years of the peace. It arose from a disputed succession to the sovereignty of the adjoining German duchy of Cleves-Juliers. Two parties claimed the inheritance. The Dutch sided with one, and the Belgians with the other, and both marched armies and seized upon towns; but they never came in contact with each other, and no blood was shed, the prudence of the archduke and the forbearance of the states-general having averted the evil, and removed the alarm created in Belgium, with very little injury to its growing industry.

The Archduke Albert, who had long been a martyr to the gout, died of that disease on the 21st of July 1621, universally lamented in the ten provinces. Though his education in Spain gave him an air of reserve and of pride, and his sole use of the language of that country was not relished by the Belgians, yet he had displayed both courage and judgment during the war, and was uniformly just, diligent, liberal, and humane. The term of the truce with the states of Holland terminated three months before this event; but it was renewed from time to time for a few months, and was at length tacitly considered by all parties as having become a final settlement.

The infanta of Spain, wife of the archduke, succeeded him as sole governor of the Netherlands; but, according to the matrimonial compact, and the clauses of the cession of Philip II., the sovereignty returned to his successor on the throne, Philip IV., her nephew. The ten provinces thus became once more a part of the Spanish monarchy. The infanta or archduchess continued in the government as vice-regent till her death, which occurred in 1633. During her government, the religious war in Germany between the Catholics and the Protestants, generally denominated the Thirty Years' War, raged with fury. Holland was agitated with theological disputes between the Calvinists and Arminians, whilst the Belgians were in repose on those subjects, having embraced with firmness the Catholic system, which was insured by the restoration of the monasteries and churches, and by the animosity created in their minds by the long war against the Protestants of Holland.

But the death of the infanta gave rise to a conspiracy against the Spanish government in the Netherlands. It is said to have arisen from the arrangement of offices, by which the commander of the army, the Duke of Berg, was mortified. The project of the conspirators was to form these provinces into an independent republic, in alliance with France and the states of Holland. The plot was, however, discovered, and some of the leaders were seized, whilst others fled. As the whole transaction was involved in obscurity, so when ascertained it was soon consigned to oblivion.

The king of Spain appointed his brother Ferdinand, a cardinal, and archbishop of Toledo, to administer the government of the Netherlands in 1634, and he arrived at Brussels with a force of more than 16,000. At that time a rivalry between the courts of France and Spain led to a treaty, offensive and defensive, between the former and the Dutch, in consequence of which hostilities were begun in 1635. As far as relates to Belgium, however, they were but of short duration. A French army advanced to the then German province of Luxembourg, occupied by the Spaniards, and in a bloody battle near Avein the latter were completely defeated. They then formed a junction with the Dutch under the Prince of Orange, entered Belgium, and captured the cities of Tirlemont and St Trond, and exercised some severities. This roused the Belgians throughout all the ten provinces. The prince-cardinal joined them with all the troops he could collect. The invaders were harassed and repulsed, and, being exhausted by forced marches and by sickness, were compelled to retreat into Holland, and, having embarked at Rotterdam, were conveyed by sea to France.

The vice-regency of the prince-cardinal was terminated by his death in the year 1641. During his government he showed considerable talent and much activity. He frequently made incursions into the frontier provinces of France, ravaged Picardy, and even alarmed Paris; and at the same time carried on a defensive war on the side towards the Hollanders. By these hostilities, the progress of industry amongst the Belgians received a severe check, whilst the demands for supplies vastly diminished the

Nether-
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sources of that prosperity to which the interval of peace had given birth. Spain herself was also much weakened by her warlike unsuccessful operations at sea, and more especially by the revolution of Portugal, in consequence of which that kingdom gained its independence, and placed Don Juan IV. on the throne. From the want of resources on the part of Spain and her Belgian provinces, the war which affected the latter was carried on with but little vigour under the vice-regency of Mello, a Spanish general who had gained much fame by his defeat of the French army under De Guiche at Hannecourt, but lost it at the famous battle of Rocroy, where the French, who conquered, were commanded by the great Condé, and nearly annihilated the Spanish and the Walloon infantry.

In the midst of these extensive military struggles, which extended throughout the continent of Europe, and whilst England was contending for its king or its parliament, a treaty of peace was in course of negotiation by a congress of plenipotentiaries assembled at Munster and Osnaburg. Several years had already been occupied at these two places in projects and protocols. At that period all Europe wished for peace, except perhaps Cardinal Mazarin, the prime minister of France under the regency of the queen-mother Anne of Austria, and Oxenstiern, the prime minister of Sweden in the minority of Queen Christina. The emperor of Germany, the king of Spain, and the Dutch republic, were the first to endeavour to bring about a general peace; and the inferior states in a short time concurred with them. The first step was taken in 1641, when some preliminaries were agreed to and signed at Hamburg; but several years passed before other places for assembling the general congresses could be fixed upon besides Hamburg and Cologne, which had been first intended. Some proposed Worms and Spire as the two most proper cities, from being near to each other; but at length the Swedes contended for Munster and Osnaburg in Westphalia, which was then unanimously approved. The Catholic ambassadors met at the first of these cities, and the Protestant at the other. When the two parties had occasion to confer together, deputies from each met at Lengerich, a small town nearly equidistant from both.

As the negotiation had been commenced by the mediation of the pope and the republic of Venice, they both sent ambassadors to the congress. These envoys took up their residence at Munster; but Contarini, the envoy for Venice, a man highly reputed for his patience and his prudence, often repaired to Osnaburg, and by his wisdom succeeded in allaying the greatest discords.

The ambassadors who composed these illustrious assemblies were the representatives of the emperor of Germany, and of the kings of Spain, France, and Sweden, each of the ecclesiastical or secular electors of the empire; the Archduke of Innspruck, the house of Brunswick, that of Mecklenburg, of Holstein, and of Baden; the Duke of Wirtemberg, Amelia Elizabeth of Hanau-Muntzenburg, the Dowager Landgravine of Hesse-Cassel, the Landgrave of Hesse-Darmstadt, those of the imperial cities, of the circle of Burgundy, and of the cities of the Hanseatic league. From Italy there appeared an envoy from the reigning Duchess of Savoy, from the Grand Duke of Tuscany, and from the Marquises of Mantua and Montserrat. To these may be added the plenipotentiaries from the seven united and independent provinces of the Netherlands, who are noticed separately, because they treated only and distinctly for a separate peace with Spain.

The king of Portugal, Juan IV., who had just ascended the throne, but had not yet been acknowledged by Philip of Spain, sent to Westphalia his ambassador in company with the ambassador of France; but the minister of Spain declared, as soon as he arrived, that if he were admitted to the congress, he had orders immediately to retire. The

emperor had demanded the admission of the plenipotentiaries of the Duke of Lorraine, and the French opposed it; and thus both the envoys of these powers were excluded. The Duke of Lorraine afterwards settled his differences with France, and was admitted at the final settlement of the treaty. The singularity of this meeting, and the important event with which it concluded, may excuse the notice of the component parts of the two bodies.

Various delays, from discussions, some of a trifling nature, some of importance, prevented even the commencement of the negotiations till 1643 or 1644; but from that time they proceeded regularly, and as rapidly as the nature of the various matters to be discussed would admit. The separate negotiation between the king of Spain and the states-general was of the most simple kind, its perplexities having been in a great degree unravelled by what had passed previous to the truce of 1609. It was, therefore, the first completed, and was signed by the plenipotentiaries of the two powers, at Munster, on the 30th of January 1648, and the ratifications were exchanged on the 15th of May following. As this treaty proceeded on the principle of the *uti possidetis*, it was favourable to the states-general, as they were in possession of more extensive territories than at the signing of the truce of 1609.

Though not immediately connected with the history of Belgium, we may here state, that the general treaty of Westphalia, by which peace was established in the whole of Europe, was definitively signed on the 24th of October 1648, to the satisfaction of all the powers except France, which complained of the Dutch having neglected to afford the stipulated support, and of the pope, who made a formal protest against the confiscation of the ecclesiastical property, and against the freedom granted to the Protestant princes to appropriate the revenues of the church to other than Catholic ecclesiastical purposes.

The peace of Westphalia, important as it was to the whole of the contending powers, proved peculiarly so to the ease and improvement of Belgium, which being now merely an appendage to Spain, had the least apparent connection with the negotiations. During the former truce the archduke and archduchess had laboured to remedy the abuses in the administration of the law which had grown up in the period of the troubles. They had sworn to maintain that compact long endeared to the Belgians by the name of the *Joyeuse Entrée*. It was formerly made to secure the states of Brabant and Limburg, including Antwerp, and to confer privileges upon other of the states; and an oath was taken at the inauguration of the duke, that if he should ever be tempted to infringe any of their privileges, none of the subjects should be bound to yield him obedience. The privileges of those states were so much valued, that it was customary for females to repair to them previous to their confinement, that their children being born within them, might have the benefit of these privileges. They granted several new charters to provinces and towns, and the privileges of the people were placed upon a footing adapted to their wants. After the peace of Westphalia, the sufferings from the recurrence of the war under the prince-cardinal were soon ended, and the joy on account of the peace and at the amount of liberty secured to them had a very beneficial effect. Anarchy gave place to regular government, persons and property were secure, the cry to arms was not heard calling the husbandman from the peaceful labours of the field, and the fertile soil was tilled with renewed industry and increased skill.

The re-establishment of the religious houses in their estates proved highly beneficial. They were mild landlords, and the peasantry that worked under them were instructed in the best means of culture. In the nunneries also industry was introduced and flourished; and the females in

Nether-
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Nether-
lands.

them were so improved, and acquired such a delicacy of touch in their fingers, that they could spin flax to a degree of fineness unequalled in any other part of the world. This gave them a great value; the nuns' thread, a kind of second-rate fineness, was sought after everywhere; and by constant practice the art of making very fine thread was carried so far, that some of that from Mechlin was sold in England as high as thirty-five pounds sterling for a pound weight, or acquired a value of more than ten times its weight in silver. Besides the fine thread which was sent to foreign countries, much of it was made into lace at home, both by nuns and by the females in private families in the towns as well as in the villages. The fame of Brussels lace was rivalled by that of Mechlin, and at a humble distance imitated in Valenciennes, then a fort of Flanders, and other towns. The soil was, and still is, admirably adapted for the growth of the finest flax; and the thread spun from it was woven into those delicate cloths which received the name of cambrics from the city where the merchants collected and bleached them, and where the trade still exists, though Cambray has since become one of the cities of France. The fine lawns of which the bishops of all Europe had their roquelaures and sleeves made, were also a product of Belgium; and, in spite of the laws which prohibited their importation in many countries, the diffusion of them could not be anywhere prevented.

It must be obvious that these branches of industry could not have flourished during the dreadful hostilities which had wasted the country; but the rudiments of the arts were not destroyed, so that they began to spread immediately after the truce of 1609, and with greater celerity after the conclusion of the peace of Westphalia, in 1648. To show the progress which had been made in agriculture, it does not seem unnecessary to notice, that Cromwell, when he obtained the supreme rule in England, sent to Flanders for husbandmen to cultivate his pattern farm at Theobolds, within ten years after the peace of Munster; and having introduced the practice of sowing clover and other grasses in the corn after the Flemish mode, became a great benefactor to the husbandry of his country.

With the revival of industry, both in agriculture and in manufactures, the fine arts also made their appearance. Painting was cherished, and the Flemings established that school which furnished works of their peculiar style, that rival the best productions of Italian art. The decoration of their religious edifices was the chief object of the artists; but in the representations of country scenery, of rural groups, of peasants, of cattle, and of domestic life, their skill has never been exceeded. Neither architecture, statuary, nor music, seem to have made much progress; and learning appears to have been almost kept out of sight, or to have passed the boundary, and taken up its residence amongst the Dutch, who in that age produced the most eminent scholars in antiquities and classics, as well as the most able cultivators of natural history and of medical science. Their theology was in a great measure confined to the dogmas of the infallible church, and their moral science to the discussions of the schoolmen. Belgium, now fixed as a Spanish province, enjoyed a long course of tranquillity. Whilst England and the Dutch, during the existence of the commonwealth and under Charles II. were carrying on hostilities, and fighting tremendous battles at sea, the provinces of the Netherlands were not in the least affected by the contest. In one instance, indeed, in the year 1672, when the united forces of France and of England were assailing the united states, the king of Spain gave orders to his governor of the Belgian provinces, Monterey, to collect an army of 10,000, and march to the relief of the Dutch. But before this force reached the scene of the war, the king of France was compelled, by the movements of a body of troops of Leopold, emperor of Germany, and

by some demonstrations of the Elector of Brandenburg, added to some checks he had received from the Prince of Orange, to abandon with great rapidity the conquests he had made; and England, withdrawing from his alliance, concluded a treaty of peace with the Dutch.

Spain, however, in alliance with the Dutch and the emperor, continued the war with France. That power had an army in Brabant, with which William, prince of Orange, who had recently married the Princess Mary of England, and ultimately ascended the throne along with her, attacked the French under Condé, and in the battle of Senef first displayed his military talents. This battle was fierce and bloody, but indecisive, and was chiefly remarkable as the last action of Condé and the first of William.

In the following year the Dutch and Belgians made an attempt to take Maestricht, which, though conducted by William, proved unsuccessful. On the other frontier the French were fortunate, and took from Belgium the cities of Valenciennes, St Omer, and Cambray. William hastened to the relief of those places, and having encountered the French near Cassel, met with a most serious defeat. This led to negotiations for peace, and a treaty was concluded between the French and Dutch, at Nimwegen, in 1678, to which Spain also reluctantly acceded in the latter end of the same year.

The increase of the prosperity of Belgium was little if at all checked by these hostilities. It had been but locally, and for a short period, the seat of war. Besides, that war was carried on with much more humanity than had been displayed in the long civil war; and as the allied troops of Holland and of Germany paid for what they consumed, it is not unlikely that the high prices paid to the Belgians for the produce of their soil proved more beneficial to them than the light additional taxes with which they were charged was detrimental.

Belgium again enjoyed an interval of tranquillity, which was well employed in domestic improvement. It experienced more alarm than evil by an irruption of the French, which the Spanish army was too weak to oppose; but William of Orange agreed, in the name of the Dutch, to a truce with France for twenty years, to which the emperor of Germany and the king of Spain gladly acceded.

The accession of William to the throne of England gave rise to a confederacy of several powers against the ambition of Louis XIV.; and, at the congress of Utrecht, in the year 1690, that prince, at the same time uniting in his person the executive power in England and Holland, was named as the chief of the confederation. The war which followed was generally indecisive, as far as relates to Belgium; Mons and Namur were captured by the French, and the fortress of Huy was taken by William. Marshal Villeroi with his army advanced to Brussels, and during three days kept up a furious bombardment, by which the town-house, fourteen churches, and 4000 dwellings, were reduced to ashes, but with no farther effect. The other events of this war, extensively as they were spread, have only a remote connection with Belgium. It was terminated in 1697, by the peace of Ryswick, where a treaty was framed very little differing from that concluded at Nimwegen nineteen years before. By the treaty Spain gained the restoration of Luxembourg, Charleroy, Mons, Courtray, and all the towns and fortresses taken by the French in the province of Luxembourg, Namur, Brabant, Flanders, and Hainault, except eighty-two towns and villages claimed by them.

The death of the king of Spain, in 1700, gave rise to a general war, which extended to almost every part of the world. He was a weak prince, without an heir to his dominions, and thought himself empowered to appoint a successor. The leading powers of Europe, and France amongst the rest, had agreed amongst themselves so to settle the

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succession as to balance the power, in conformity to the treaties then existing. The dying king, displeased with this distribution of his dominions, by his will bequeathed them to the Duke of Anjou, the grandson of Louis XIV. king of France, whose ambition had by his previous conduct roused the jealousy of almost all the other states. Louis, who during the peace had kept up his armies to their full war establishment, was prepared to maintain, by force of arms, the disposition of the Spanish monarch. This gave rise to the Grand Alliance, usually considered as the master-stroke of policy of King William. About the same time King James died in France and William in England; upon which Louis acknowledged the son of the former as king of England and Scotland. As William had died without issue, Anne ascended the throne. The declaration of Louis operated to unite the parties in England, and to enable the new queen to extract from her subjects extraordinary supplies for carrying on the war.

The events of this war belong to the history of Europe, and not to that of the Netherlands peculiarly, though the latter country was one of the prominent scenes of its transactions. The parties to this alliance were at first only the emperor of Germany, the sovereign of England, and the states-general of the united provinces; but other princes, both in Italy and in Germany, were subsequently included in it, either as allies or as auxiliaries. The Netherlands was a part of the countries contended for, and to a limited extent, and during limited periods, the theatre of bloody battles and sieges; but as the contending parties wished to occupy and not destroy the provinces, they suffered but little, and the contending armies expended so much money in the country, that the capital left behind was thought to be more beneficial than the injury sustained amounted to. The battering down the walls of some of the towns, the blowing up of forts, and even the casual trampling down of the growing crops, inflicted but transient inconvenience; whilst the large sums expended by the numerous troops of English and Dutch, officered by some of the wealthiest and profuse men in Europe, and paying for the productions of the soil rates far beyond the cost to the cultivators, remained in the country, and formed a capital the influence of which was felt long after the operations of war had ceased.

After various successes in some quarters, followed with reverses in other parts, France became exhausted, and was ready to make peace upon any terms; and the allies, too, were weakened and ready to enter into treaty. But the emperor and Holland wished to reduce Louis still more, when an intrigue in the English female cabinet led to a feeling in the government in favour of the pretensions of France, in opposition to the views of the allies. England resolved on peace, and entered into secret negotiations with France. Holland could hope for nothing from that power when thus left alone. The Emperor Leopold died about this time, and was succeeded by his brother Charles, who had been during the war a competitor with the Duke of Anjou for the throne of Spain. That kingdom thus became an object of less personal consequence to him than before. In these circumstances, the negotiations were commenced in January 1712, and terminated definitively by the peace of April 1713, usually denominated, from the place where it was signed, the peace of Utrecht. By this treaty, Spain, with her transmarine dominions, were secured to the Duke of Anjou, Gibraltar and Minorca to England, whilst the ten provinces of Belgium were assigned to the emperor of Germany, and now assumed the name which it long bore of the Austrian Netherlands.

These provinces were finally delivered up to the emperor in 1716. From causes which the preceding narrative must render very natural, there was considerable discontent amongst the people; and it was only by extreme

severity, and almost overwhelming precautions, that a general revolt was prevented. After the first ebullitions of disgust had expended their force, as peace was restored, and prosperity followed, no difficulty seems to have been found in governing the country; and neither revolts nor punishments were spoken of during the fifteen years which passed before the accession of Maria Theresa to the imperial throne. Whatever may have been the early repugnance of the Belgian people to the Austrian dominion, they became gradually reconciled to it; and the benevolent reign of their new duchess converted the Netherland population into faithful and devoted subjects to the house of Austria. Her government was just, mild, and firm; her religious opinions and acts corresponded to their own, and she made no infringements on the *Joyeuse Entrée*. The continuance of tranquillity afforded time for industry to develop its power; and agriculture, the chief industry of the country, was constantly improving, and enriching proprietors, cultivators, consumers, and, in short, every one of the classes which composed the nation. The foreign trade, however, which had in ancient times crowded to the cities of Antwerp, Ghent, and Bruges, was not renewed, as the closing of the Scheldt had been one of the conditions of the several treaties with the Hollanders; and Ostend and Nieuport, the other seaports, were of very little use to Belgium.

The tranquillity of Belgium was interrupted by the war which broke out in 1743. The French, under Marshal Saxe, after he had gained the battle of Fontenoy in May 1744, invaded Belgium, took Brussels and several other towns, and thus placed the whole of the Austrian Netherlands in the power of Louis XV. But the treaty of Aix-la-Chapelle in 1748 terminated hostilities, and Maria Theresa was again established in her Belgian possessions, as she had enjoyed them before the war. Though reduced to a state of widowhood by the death of her husband Francis I. who had been raised by her to the imperial dignity, she ruled singly her vast possessions, with so much mildness, united to firmness, that her name even to this day is cherished in Belgium, as amongst the dearest recollections of the people. Her good sense and good feeling preserved her from overstepping the bounds of the ancient laws. She had no temptation to abuse her power, nor had her subjects any cause for want of fidelity in their allegiance. Reforms were necessary in many of the local, provincial, and commercial regulations; but in effecting them she violated no principles, wounded no opinion, shocked no prejudice, so that they were affected with but slight murmurs, and no resistance. The rude burghers of Flanders abandoned their hereditary right to an independence of the more exaggerated kind. Faction itself yielded homage to the ascendancy of justice, and social civilization made a rapid progress throughout the whole country. During the Seven Years' War which terminated in 1763, the Belgian dominions of Austria bore their share of the pecuniary burdens and levies of men in the early part of the transactions; but it suffered none of those inflictions which visit a country that is itself the seat of war. After the peace of Paris, the Austrian Belgian states continued to flourish. The government was indeed an absolute monarchy; but the municipal laws still retained a great portion of their popular character, and the political privileges of the people were considerable. This mixture of sovereign power with popular rights, or rather the prerogative of an aristocracy of nobles, clergy, and lawyers, worked well and gave general satisfaction during the whole reign of Maria Theresa. In November 1780 this princess was succeeded by her son Joseph II., whose own mind was somewhat tinctured with that infectious desire of organic changes which the contest between England and her North American colonies had spread throughout Europe.

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Joseph was inaugurated with the ancient formalities, and both he and the states swore mutually, he to preserve the ancient privileges, and they to yield obedience as long as he maintained them. This compact, already noticed under the name of the *Joyeuse Entrée*, included the varying rights of the several states, those of the ecclesiastical bodies, and of the courts of law, and the privileged influence of the nobility. As Joseph examined more minutely into the interior affairs of his dominions, he saw with concern the extensive despotism exercised by the clergy, and in no part so much as in his Belgic provinces. He saw that religious power had overstepped its boundaries, and infringed upon the power of sovereigns; and he honestly felt it his duty to bring it within more beneficial limits. Had he done this by degrees, he might have gradually restored each branch to its due equilibrium; but he was anxious for a speedy reform, and not sufficiently cautious to avoid conflict with prevailing prejudices. He began by breaking the dependence in which the clerical body was united to the pope, and, by his decrees in 1781, soon after his accession, commanded the clergy to grant dispensations for marriage without any reference to the holy see. In the following year decrees were issued, commanding the celebration of marriages between Catholics and Protestants, in defiance of the canonical laws and customs then in force. Of the convents and other religious houses, which were very numerous, some were abolished, and in others the rules of the institutions were altered, if not reformed, by a simple proclamation. At length the episcopal seminaries which were under the direction and control of the prelates were abolished; and two universities were established, one at Louvain, the other at Luxembourg, which, though better adapted for the diffusion of knowledge than the old colleges, were looked upon by the priests, and also by the laity, who were under the influence of the priests, as a dangerous and even heretical innovation, and the more noxious, because they were under the sole jurisdiction of the emperor himself.

The dispositions of Joseph towards his favourite projects of reform were not restricted to the ecclesiastical bodies, but in a short time assailed the old-established and deeply-cherished administration of law, leaving to it only the ancient principles of the Roman jurisprudence. The electoral colleges of the provincial states were abolished, as well as the courts and councils by which justice was dispensed, and the whole of the signioral and ecclesiastical jurisdictions. By these decrees the lawyers, next to the clergy the most influential body, were either injured or highly offended. Some were apprehensive of losing their professional practice, and others were removed to new situations; for new courts had been erected upon a simple and uniform plan in each of the provinces, with a supreme court at Brussels controlling all the provincial courts. On this account it was deemed necessary to divide the whole territory into nine circles, by which the local powers of the magistracy were disturbed, and in many instances destroyed, without an efficient substitute being established in their stead. The privileges of the several municipal and other corporations were next violated by the appointment of their officers in virtue of the sovereign authority alone. As discontents arose from these proceedings, the states of Flanders and Hainault at length declined to vote the usual subsidies; upon which a decree was issued, stating, that in consequence of this refusal, the emperor held himself absolved from every obligation towards the states, and on that account declaring the abolition of the representation of those states. Without entering into the merits or demerits of the projects of Joseph, it is clear that the chief design of them was to benefit the people, by disseminating amongst them more tolerant feelings in religion, and a better administration of justice, by virtue of the in-

creased power of the executive government, and not by any extension, or even intervention, of popular feeling and co-operation. At the time when these new ordonnances were promulgated, the democratic spirit had arisen in France; and though a similar tendency was not discoverable in Belgium, yet the growing discontent, caused by the introduction of measures of genuine liberality, produced an insensible bias towards republicanism, which had its effect on subsequent events.

It was not till 1787 that the consequences of the rapid measures of the emperor had raised such a spirit of dissatisfaction as to lead to the apprehension of active opposition. But as the whole body was in a state of excitement, a spark was sufficient to cause an explosion. The syndics or chiefs of the corporation of Brussels, supported by those of Antwerp and Bruges, presented memorials to the governor, Prince Albert of Saxe-Teschen, which in strong terms pointed out the danger of insurrection if the obnoxious decrees were persisted in and acted upon. The governor was alarmed, and suspended the execution of the decrees till the pleasure of the emperor could be known, and held out hopes of prevailing upon him to remedy some other complaints. These assurances diffused joy throughout the states, and the day upon which they were given, the 30th of May 1787, was ordered to be hereafter consecrated as an anniversary of rejoicing. All this joy was, however, premature. The resolution of the emperor had to be waited for; and he was with his army carrying on the war with the Turks. On his return, two months afterwards, so far from ratifying the concessions made to his Belgian subjects, he despatched his mandates in an angry tone, declaring that he had never intended to subvert their constitution, but sought only to correct abuses and introduce salutary reforms. He required as a proof of obedience, that the states of each province should send deputies to Vienna, to lay their complaints at the foot of the throne. He professed to retain the sentiments of a father, and knew how to pardon the errors and temerity of his subjects, but threatened them with severe chastisement if they refused the mark of respect that he demanded. He also informed them, that he had called to the capital the governor of the provinces, and the commander of the army, that they might act as mediators between him and his subjects.

This intelligence filled the provinces with consternation; but it was nevertheless resolved that deputations should proceed to Vienna. Whilst on their road, accounts reached them on all sides of the prodigious force which was on its march to the Netherlands, and of the consent of the several princes between that country and Austria having been given to the passage of troops through their dominions. But these rumours, instead of terrifying the Netherlands, roused them to resistance. The most prominent leader of the party was Vandernoot, a lawyer of some eminence, who had been the most energetic orator in the states.

When others had been arrested, he made his escape, and found refuge in England. He now repaired to Breda, and there established a kind of committee, who conferred on him the title of agent plenipotentiary of the people of Brabant. He attempted to draw the Prussian, English, and Dutch governments into some negotiations, with a view to favour the cause of the dissatisfied Belgians; but though unsuccessful in these attempts, he succeeded in inflaming the passions of the people to a high degree of religious frenzy, a work in which he was zealously assisted by the powerful exhortations of the ecclesiastical body. The Netherlands were in all ages a military people, and, when once roused to activity, capable of displaying great energy. Arms were seized by the populace, and a commander offered himself in the person of Van der Mersch, a soldier of fortune, who had risen from the ranks to the command of a regiment during the Seven Years' War. A formal act

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by an armed body under this commander declared that the Emperor Joseph had forfeited the sovereignty of Brabant; and this was followed by the advance of the forces he had collected in the direction of that province. His conduct was cautious and considerate, and he diligently directed his efforts to introduce order into bodies of men inspired with a degree of fanatical confidence which it was difficult to restrain within the necessary bounds of discipline. The Austrian troops were few in number, and Van der Mersch approached them cautiously. Having by some feints and stratagems induced them to follow him into the narrow streets of the town of Turnhout, situated between Antwerp and Breda, a bloody contest took place, in which the imperialists were finally defeated, with a loss of lives far exceeding that which the army of the insurgents had suffered. He immediately penetrated into the province of West Flanders, where he was received with open arms by the inhabitants, and speedily became master of Ghent, which was taken by assault, and of Bruges, Ypres, and Ostend, which voluntarily surrendered. The imperial government now thought it prudent to withdraw from Brussels; and upon this the states of Brabant and Flanders assembled, on the plan of the ancient constitution in that city. Soon afterwards Vandernoot and his associates arrived from Breda, and having made a triumphal entry with great solemnity and parade, were received with the most joyous acclamations by the enraptured inhabitants. The imperial forces being dispersed, and no fresh succours arriving, the states, in 1790, formed a treaty of union, which comprehended the seven provinces. Hitherto all had been done by the excitement of religious bigotry; but there soon began to appear symptoms of a fanaticism of the very opposite character. Van der Mersch, the successful general, was accused of holding French principles; and Vonck, an advocate of Brussels, was inculpated in the same charge. In the violent squabbles of party it is difficult to ascertain the truth; how far these men had imbibed Jacobinical opinions, or whether they had imbibed them at all, it is difficult and needless to ascertain. It became, however, the signal of disunion, of which the Catholics availed themselves in order to excite general abhorrence of Van der Mersch, as a monster of impiety and treason. Vandernoot, aided by an ecclesiastic of more talent than himself, named Van Eupen, took the lead in the general assembly of the nation. Religious fury was carried to the greatest excess; and the excited populace, urged on by the clergy, proceeded to the most violent outrages against the opposite party. Vonck and his party fled to save their lives, and their houses were broken into and pillaged by the populace. Scenes of the most revolting nature were exhibited throughout the country. These were encouraged and even participated in by the priests, who, with the sword in one hand and the crucifix in the other, breathed out the most horrid imprecations against those whom they called infidels or heretics.

During these proceedings the army became totally disorganized and inefficient. An open rupture took place between the commander of the forces and those who had the direction of public affairs. The troops abandoned their general, and adhered to the civil rulers, chiefly on account of their attachment to the Catholic religion. He left the army, accompanied with the curses of the populace, by whom Vandernoot and Van Eupen were almost deified. In Brussels, the people bent the knee when they gazed on the picture of the one, and uncovered their heads when they pronounced the name of the other.

Whilst the Netherlands were unassailed by open hostilities on the part of their imperial sovereign, and the bigoted party were indulging their narrow-minded measures of policy, the Emperor Joseph, who, with respectable talents and the best intentions, had failed in every

thing he undertook, was removed from this life. He died on the 20th of January 1791, accusing his Belgic subjects of having caused his death, and was succeeded in his extensive dominions by his brother Leopold.

Leopold manifested much sagacity and moderation in the measures which he adopted for the recovery of the revolted provinces; but their internal disunion proved his best ally. The states-general occupied themselves almost exclusively in attempts to re-establish the monkish institutions which Joseph had abolished; and having dismissed their able general on account of heresy, and thereby disorganized the army, they had the temerity to reject with scorn the overtures which the new emperor addressed to them.

The imperial forces had been collected on the frontier, and the command given to General Bender. These troops with their appointments were sufficient to overcome all opposition that could be offered by a country the government of which was compounded of ignorance, bigotry, and rashness. As the imperialists advanced into the provinces, town after town opened its gates; Vandernoot and his associates saved themselves by a rapid flight, and sunk into obscurity. A short campaign gave the emperor quiet possession of the whole of the provinces; and, on the 10th of November 1791, he concluded a convention with England, Holland, and Russia, by which an amnesty was granted for all past offences, and assurances given to the people that their ancient constitution and privileges would be respected. In conformity to this treaty a succession of edicts were issued, revoking all the offensive ordonnances of his predecessor, re-organizing the provincial councils, and re-establishing the form of government on the same popular footing on which it had existed during the reign of Maria Theresa. These arrangements were only completed a little before the death of Leopold, an event that happened suddenly on the 1st of March 1792. His son Francis II. succeeded to the throne, and under his reign the final separation of the Belgian provinces from the imperial family took place.

The new emperor, soon after his accession, found himself involved in a war with revolutionary France. His forces, conjointly with those of Prussia, invaded that country, and, after advancing to Champagne, were repulsed with tremendous loss. France then became the assailant of those powers and their allies, and one of her first great efforts was directed against the Belgian provinces of the house of Austria. The battle which decided their fate was fought at Jemmappes, near Mons, on the 6th of November, and terminated in a decisive victory in favour of the French, commanded by General Dumouriez. The result of this action was to place the whole of Belgium at the mercy of the conquerors. The Austrians were driven out of the country. Dumouriez made his triumphal entry into Brussels on the 13th, and, immediately after the occupation of that city, the whole of Flanders, Brabant, and Hainault, with the other Belgic provinces, were subjected to France. Soon afterwards, several pretended deputies from the Belgian people hastened to Paris, and implored the convention to grant them a share of that liberty and equality which were to confer such inestimable blessings on France. Various decrees were in consequence issued; and, after a variety of procedure, the incorporation of the Austrian Netherlands with the French republic was in due form decreed, at the commencement of the year 1793, whilst the scaffold was preparing for Louis XVI.

But, even in the first moments of enthusiastic excitement, few of the Belgians wished for a junction with France; the spirit of nationality was still uppermost, except with those who were mercenary or fanatical. A number of individuals had formed themselves into what they called patriotic associations, in the several towns of

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Belgium, and, being drilled into obedience by commissaries despatched from the French convention, sent their emissaries to France to misrepresent the national feeling. There were however in Belgium many men of cool judgment, respectable character, and large property, who saw both injury and danger from the proposed annexation; and they sent counter-deputations to explain the difficulties attending the proposal. Each of the deputies who asked for the conjunction was honoured with the *accolade* by the president of the convention, whilst each petition on the other side was received with indifference, and its reasoning unheeded. The peaceable remonstrances were put down by the clamour of the adherents of the French Jacobins. Dumouriez himself even wrote to the convention, that the wishes expressed in Belgium for the junction with France "were forced from the people by strokes of the sabre." In spite of the efforts to oppose them, however, the decrees for a union were issued, and preparations made for their practical adoption. But they were for a time frustrated by the events of the war. The strong city of Maestricht still held out against the French. It was besieged without success, owing to the want of military skill on the part of Miranda, a Spanish American, who had been transformed into a general. This, with the circumstances arising from Dumouriez quarrelling with the convention, his unavailing attempt to turn the army against them, and his ultimate flight, had greatly demoralized and disorganized the French army; and it was in this state when the campaign opened in March 1794. The Austrians had collected on the frontier towards Germany a large force under the Prince of Saxe-Cobourg, which entered Belgium, and gained the battle of Neerwinden, with many other less considerable contests, owing to which the French were compelled to abandon all their conquests with a rapidity quite equal to that with which they had accomplished them.

The Belgian provinces were thus once more restored to the house of Austria, and the emperor nominated his brother, the Archduke Charles, as his viceroy. His occupation of that post, however, was but of short duration. The frontier provinces of Belgium became the seat of bloody contests, in which were opposed to France armies composed of Austrians, Germans, English, and Dutch. Without here entering into details, we may remark, that the question respecting the occupation of Belgium was determined by the battle of Fleurus, fought on the 25th of May 1794. After that important victory, the French became masters of Belgium; and the representatives of the city of Brussels once more repaired to the national convention of France to solicit the incorporation of the two countries. This, however, was not finally pronounced till the 1st of October 1795, by which time the rapacity of the French commissioners, and the violent measures enforced, had given a tolerable sample of what might be expected from an arbitrary government concealing its despotic tendencies under the cloak of liberty. The discussion in the French convention on the subject of the annexation of Belgium had occupied two days; and there were not wanting a few members who resolutely opposed the union, and spoke boldly against the injustice of the measure, founding on the repugnance of the Belgians, as well as the dissimilarity in point of religion, manners, and morals between the two countries. Reasoning, however, was of little avail when opposed to the ambitious spirit which actuated the majority of the convention, who already looked to the period when, by the extension of their limits, the Rhine should form the eastern boundary of the republic. A new system for a division of the Austrian Netherlands and of the bishopric of Liège into nine departments was adopted, and they were declared integral parts of the French republic. This new state of affairs was at length consolidated by the preliminaries of peace signed at Leoben, in Styria, between

Napoleon and the Archduke Charles of Austria, and confirmed by the treaty of Campo Formio, signed October 1797.

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From the occupation of Belgium, its history as a nation becomes a blank for nearly twenty years. It formed a part of France, and shared the triumphs and defeats of that country under the republic, the consulate, and the empire. The ancient institutions, in the defence of which the people had revolted against their former governments, were completely swept away; their religion was also stripped of its power, its decorations, and its ministers reduced to almost apostolical poverty. Their monastic and charitable institutions were either abolished, or, by the confiscation of their valuable property, reduced to the most depressed state. The laws, and the courts of justice, which were endeared to them by usage, were made to give place to a new system, administered by incompetent magistrates. They became subject to a system of taxation, which, though equal in its distribution, was heavier than Austria had ever required either in peace or in war. But the worst of the requisitions was that for personal service in the armies of the conqueror, and which was so extended in its demands by the conscription law, as to be deeply felt in every domestic circle. Such were the evils which, if the Belgians durst not openly complain of them, they never ceased to lament; but it must be observed, that the property of individuals was protected by the government; that agriculture could be pursued, and any improvements the cultivators chose to adopt introduced; and that, both in France and in Holland, they had good markets for their produce. From political circumstances, the manufacturers were protected against the rivalry of English woollen, and especially cotton goods, which, as far as the fabrication of them extended, became a beneficial employment of capital. The mines of iron and of coal, chiefly in the province of Hainault, were beneficially worked; and the hardware of Liège and its vicinity afforded occupation to a hardy race, and such wages as enabled them to subsist in a state of moderate comfort.

At the commencement of Napoleon's government, he had arranged and established an excellent system of local administration in the whole of his vast dominions; but it was a system, like that of all arbitrary monarchs, which required the vigilant superintendence of the hand that had framed it. In the latter part of his reign the whole of his mind was absorbed in the single point of gaining that universal dominion which had become his grand object. Owing to the absence of his vigilant attention, the system had not been so strictly adhered to as it should have been; and throughout the whole of France, but especially in Belgium, the local administration had become confused in its action, and of little benefit to the community. The roads, bridges, canals, and public edifices, except as they were connected with military purposes, had been neglected, and were gone to decay for want of early reparation. The greatest evil that arose from this negligent administration was felt in what relates to the education of the people. In Belgium, as well as in the majority of the departments of France, amongst the inferior classes of society, the youth grew to maturity in a degree of ignorance approaching to brutality. There existed everywhere something that resembled public schools; but they were in a most deplorable state, dirty, dark, and without order; whilst the teaching was limited to tracing a few words or letters, and to reading or reciting a few passages without understanding the sense of them. Useful books were not provided, and the children were frequently observed, from the want of better means, handing from one to the other an old almanac, a torn book of prayers, or the detached pages of some old newspaper. The condition of the instructors was commonly wretched, and the discipline practised was either harsh or indolent, or both.

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In Holland, a most valuable system of local administration had prevailed, which from ancient times had been found highly beneficial. When that country was added to France, the system had not yet given way to the general plan of the empire, and the roads, canals, and dikes, as well as the schools, had been left to the same direction and superintendence as formerly. Under the reign of Louis Bonaparte, they had been cherished and somewhat improved; and the consolidation of Holland with France had hitherto produced none of the evils which affected Belgium. To this circumstance may in some measure be attributed that difference of character between the two people, which will be found displayed in the subsequent events that come under our notice in the progress of this history.

Except in one important respect, the country now called Belgium, when forming only a few departments of France, may be viewed as rather in a flourishing state. The demand for personal service, however, pressed heavily on it, as well as on all the other portions of that great empire, inasmuch as it robbed the land of the labourers who were required for its cultivation, and left a large portion of the work to be performed by the females, or by the males who had not reached maturity, or had passed the age when the human frame is capable of severe labour.

The evil of the conscription was, however, counterbalanced by the freedom from actual warfare. The scenes of contest had been removed far from its boundaries, and, during the whole period of the union with France, its fields had been untrodden by armies. Two attempts had been made by England to invade Belgium. The first was the landing of a few troops intended to destroy the means of water communication. They disembarked at Ostend, and, after damaging some of the sluices, were under the necessity of yielding to a superior force. A grand attempt was made in the year 1809 to take Antwerp, and to create a diversion in favour of the allied powers, by operating from Belgium on the communications of Bonaparte's army, then advancing towards the east of Europe. This, however, though the largest naval and military force that had ever been despatched from English ports, proved a total failure; and it never reached Belgium, its advance having been retarded, and the design at length frustrated, by the siege of Flushing, and a most dreadful mortality amongst the troops on the island of Walcheren.

The internal tranquillity of Belgium, whilst vast armies were collected in other parts of Europe, had considerable influence on the great pecuniary interests of that country. Its chief productions are those of the soil and of the first necessity. The consumption of the vast armies had raised the prices in every part of Europe, and none reaped greater benefit from the advance than those who cultivated the fertile fields of Belgium.

The reverses experienced by the French armies during the invasion of Russia were followed by others of a similar kind in Germany, till the issue of the great battle under the walls of Leipzig, in October 1813, excited a general hope throughout Europe of being delivered from the military tyranny that had long oppressed it. This hope gave animation to the minds of the men of Germany, more especially at first, and was from them rapidly communicated to other countries. Its effect was powerful in Holland; but, if felt, it was scarcely perceptible in Belgium. The difference in feeling between the two divisions of the Netherlands may in part be accounted for from the longer duration of the union of Belgium with France, which had now reached its twentieth year; whereas Holland had been incorporated with that empire but little more than three years when the battle at Leipzig decided the fate of Europe. Belgium, under the character of a portion of France, had enjoyed a degree of prosperity in its agricultural in-

dustry; whilst Holland, mainly depending on foreign and colonial commerce, had been brought, not to the verge, but into the very gulf, of ruin. The feeling of nationality had been weakened during twenty years in Belgium, whilst it had been strengthened in Holland by three years of suffering. The mode of action in the two countries at the crisis produced by the victory of Leipzig merits notice here, because upon the contrast between them depended the character of that series of transactions which subsequently occurred.

The intelligence of the defeat of the French had no sooner reached Holland, than a spirit began to show itself which alarmed General Molitor, who commanded the forces of Napoleon in that country. His head-quarters were in Amsterdam; and fearing an insurrection in that populous city, he resolved not to be surprised in the narrow streets, but, contrary to the opinion of Le Brun, duke of Plaisance, and of Count Celles the prefect, withdrew with his troops to the more defensible city of Utrecht. The whole of the French troops in Holland did not exceed 10,000 men, and a part of these were in garrison in the fortified places. The intolerant tyranny of the French government had made the whole population ripe and eager for revolt. This disposition was taken advantage of by a few able, influential, and patriotic men, the most prominent of whom were Count Gysbert Charles von Hogendorp, eminent as a diplomatist and statesman, and Count Van der Duyn de Maasdam, a man of enterprising genius and judgment. On the 21st of November 1813, they made the first movement at the Hague, unsupported by any armed force, excepting a few of the old city guard, and a number of gentlemen with fowling-pieces, and solemnly proclaimed that the people of Holland had returned to their ancient state of independence and freedom. Amsterdam, at all former periods the most powerful city, and the focal point of the ancient union, was the first to renounce its preponderating superiority in the government, and, immediately after the movement of the Hague, proclaimed the Prince of Orange as the sovereign of the country. The decision of Amsterdam was communicated from city to city, and received an universal concurrence, plainly showing the spontaneous wish of the whole Dutch nation.

A provisional directory was immediately formed, consisting of six persons, who sent Messrs Fagel and Perponcher as envoys to England, to recall the Prince of Orange to his native country, from which he had been long banished by the foreign domination that had ruled it. The allied armies on the frontiers were made acquainted with the events which had transpired; and when some of their forces arrived, they found the insurrection had been so successful that nothing was needed but a short space of time to consolidate the power gained by the arrival of the prince. During the events of the few days, the force under Molitor at Utrecht was kept inactive by the movements of General Bulow and his division of the Prussian army, which had arrived at Munster, and was advancing towards Arnhem.

The Prince of Orange landed on the 30th of November, at Schevelling, and his arrival in his native country completed the great work of its enfranchisement, and the establishment of its political and civil freedom. The invitation had been spontaneous, and the government had been offered to him with no restrictions or conditions; but he gave instant proof that he had no desire for arbitrary power, by issuing a proclamation, in which are the following words: "Je me rends à vos vœux; mais je l'accepte uniquement à condition qu'elle soit suivie d'une constitution qui garrantisse vos libertés, et les mette en sûreté contre toute atteinte."

On the 6th of December the prince assumed the sole executive authority, and brought to that task all the active industry, penetration, and regularity by which his

Nether-
lands.

whole reign has been distinguished. The fortresses were mostly held by the soldiers of Napoleon. Many bodies of the allied armies were on the frontiers, but none felt more acutely than William that no country can be independent in the presence of foreign armies, whether consisting of friends or foes. He wished that the same hands which had conquered the national freedom should defend and maintain the precious blessing; and that thus the allied powers might be enabled to unite their forces, and march on towards France, where the decisive battle of liberty was to be fought. The first object, therefore, was the formation of an organized army; but this was attended with immense difficulties. The country was completely destitute of arms, ammunition, and every thing necessary for the equipment of an army, so that it was impossible to clothe the new levies; and the severity of that remarkable season prevented the removal of stores from one part to another, and the arrival of the various necessary articles which were provided and despatched from England. Notwithstanding these difficulties, an army of 25,000 was enrolled, armed, and equipped in the space of little more than three months, out of a population of 1,800,000 souls, in a country which had been previously drained of active men by the conscription, and some parts of which were still held by the enemy. In the month of March the prince was enabled to announce to the public that a force to that extent was ready, and would soon be united on the frontier under the command of his eldest son, who had distinguished himself whilst serving in Spain under the Duke of Wellington.

The formation of a constitution proceeded simultaneously with the creation of an army. The first sketch of the constitution had been framed by Count Hogendorp. It was submitted to the consideration of fifteen persons of the most approved integrity and most enlightened judgment; and after their revision it was transmitted to the prince, who accepted it as the fundamental law of the state, as being in harmony with the manners and the habits of the nation, and conformable to the wants and the spirit of the age.

The scheme, thus far approved, was then printed and distributed over the whole country, previous to the assembling of a meeting of Notables, who were to be selected for that purpose from all the provinces and towns, including persons of all religious persuasions, whether Jews or Christians. Twelve hundred names were selected, of the most proper persons, being householders of various descriptions, but not including those in the service of others, those who had, within the last six months, been relieved by the public charitable institutions, or those who were insolvent, in prisons, or under the surveillance of the police. The lists were ordered to be exposed during eight days, in each small district in which a justice of peace was established, that each householder might affix his approval or disapproval of the individuals named in them. One half the number, as determined by these votings, were to be excluded, and the remaining 600 were appointed to meet on the 24th of March. After a few hours spent in deliberation, the acceptance of the fundamental law was decided by a majority of 458 votes against twenty-five. There were 117 absent, many of them kept away by unavoidable circumstances, some by a feeling that they were not sufficiently authorized to give a decision on so important a subject, some from judging that the power of making peace and war was held by the prince alone, and a few from religious scruples. The more rigid Calvinists thought the Protestant religion would suffer by admitting persons of all persuasions to public offices, and some Catholics complained that there was not a sufficient provision made for the maintenance of their clergy and their institutions. If the whole of the absent members had voted, as their opinions were

well known, it was calculated that the measure submitted to them would have been accepted by five sixths of the number.

Mr Chad, secretary of legation from the court of St James's, who was then officially in Holland, says, "Persons accustomed to the spectacle of the impetuosity and ardour of political discussions in England, would perhaps have been surprised at the calm moderation with which this transaction was accomplished in Holland." But he adds, that from all the information he could in any way acquire, he never could learn that the government of the prince made the least attempt to control, or even to influence, the public opinion.

In consequence of thus organizing a form of government, the prince assumed the title of king, and his eldest son that of Prince of Orange. The state which had thus secured its own independence was immediately acknowledged as such by all the governments of Europe; not by the formality of any treaty, which would have weakened rather than strengthened the right, but as an assumed fact, evidenced by the mission of ministers to the court of king William from the sovereigns of the great powers of the civilised world.

We turn now to the conduct pursued by the Belgians in this crisis, not with the view of inculcating the people of that country by the contrast, but in order to place before the reader a simple narrative of the occurrences. No effort was made, nor the slightest indication displayed, which could give encouragement to the cause of the allied powers against the common enemies of Europe. It is probable that the Belgians saw, with great though silent satisfaction, the progress of the allied armies. But the Belgian provinces were not, like those of Holland, situated at the extremity of Napoleon's empire, and thus out of the reach of that immediate chastisement which a premature revolt would surely have brought down on them. It would have been difficult to create a central point round which to rally the scattered elements of insurrection; nor had the Belgians a family or chief upon whom to fix the general hopes of the country, or fitted to secure the confidence of foreign powers. But, worse than all, they had no legitimate and acknowledged nationality that could inspire them. Their past recollection could only present to their minds the prospect of a subservient junction with some other country, such as had always been their fate; and as they had no expectation of being left to their own choice in that junction, there was little to inspire them with the ardour of patriotism.

No hostilities took place in Belgium, except an attack by bombardment on Antwerp by a united force of English and Prussians, which was productive of no consequences, as the army of the latter was ordered to advance into the territory of France itself.

The French troops abandoned Belgium as the allies advanced, and in January 1814 the Duke of Saxe-Weimar, one of the allied generals, entered Brussels without any opposition. But his troops had merely a military occupation of the country; and the emperor of Austria, then advancing towards Paris, despatched from Dijon Baron Vincent, who had been commissioned *pro tempore* to act as governor of Belgium.

From the events in Holland and Belgium our attention must now be turned to Paris, where the allies, after driving away Napoleon and seating Louis XVIII. on the throne, had convened the ministers of the several powers, to restore tranquillity and order in those parts of Europe which had been disorganized by the victories of the French empire.

This august assembly, in the midst of the congratulations which the extraordinary scenes that had thus collected them produced, did not forget the perils they had

Nether-
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Nether-
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Nether-
lands.

escaped, nor the danger which might still arise behind the glory of their triumphs. Bonaparte was indeed dethroned, and a Bourbon seated on his throne; but the spirit of foreign conquest and universal dominion was not extinct in France, with its millions of men still animated by the desire of domination, and smarting under the severe mortifications which their vanity had recently suffered. The throne that had been restored was still in a tottering state, all the institutions which formerly supported it having been swept away; and, besides, the remains of the defeated armies would soon be joined by thousands of men who, having been made prisoners, would return filled with angry passions, and fully prepared to aid in any combinations which might have for their object the plunder of foreign countries, the subjugation of foreign potentates, and the superiority of the military over the civil authority throughout France itself, as well as over all Europe.

Aware of the dangers lurking behind their success, the allies directed their attention to such measures of security as seemed most advisable, in case a re-action in France should again throw the power of that kingdom into the hands, first, of the populace, and then, as a necessary step, into that of some military leader.

Belgium had, by the right of conquest, fallen into the power of the allied sovereigns. From its position it had been the battle-field of Europe in former periods; and the possession of that country by France would be of vast importance as an advanced post, from which she might easily proceed to other conquests. The house of Austria, having always found the Belgian provinces a source of trouble and annoyance, was ready to abandon its claims; trusting thereby to secure some advantages nearer the centre of its power. The Netherlands, if united under one power, might be sufficiently strengthened to become a strong barrier against France, and the means of securing the continuance of that general peace which was then so much desired, and indeed wanted. Belgium, and the other territories near it, the bishopric of Liège, and the duchy of Luxembourg, were considered merely as European objects, which were so to be disposed of as would best suit the purposes of the combined powers, particularly that of securing the tranquillity of the great community of nations. It was not, then, from any peculiar favour to Holland, or from any personal regard to King William, though his minister formed one of the assembly, that, in less than two months after the seizure of Paris, it was adopted as a principle by the representatives of all Europe, and promulgated to the world, "that Holland, placed under the sovereignty of the house of Orange, should receive an increase of territory." This declaration was made on the 30th of May, and at the time received with general approbation, although at a subsequent period it was one of the principal grievances set forth by the Belgians in their declaration of independence. The principle thus announced received its final sanction by a treaty dated the 21st of July, in virtue of which Baron Vincent was to deliver over to King William the provisional power he exercised in Belgium, upon the following conditions, viz. 1. That the two countries should form one state, governed by the constitution already established in Holland, to be modified by common consent: 2. That there should be no alteration in that part which assured to all religious sects an equal admissibility to public offices: 3. That the states should assemble in alternate years in a city of Holland and in one of Belgium: 4. That all the inhabitants of both parts should be alike in all commercial matters, without any restriction being imposed on one for the benefit of the other: 5. That the provinces and cities of Belgium should be admitted to the full enjoyment of commerce with the colonies: 6. That all expenses should be in common, and the debts of the two parts should be assumed by the treasury of the kingdom: 7. That the ex-

pense of maintaining and strengthening the fortresses should be defrayed from the common treasury: and, 8. That the cost of supporting the dikes should be furnished by the districts more immediately interested in them; but in case of any great disaster, succours were to be supplied by the general government, in the same manner as had formerly been practised in Holland. The king of England, by a separate treaty, on the 13th of August, agreed to give up to the newly-created king of the Netherlands all the conquests made from the Dutch during the war, with the exception of the Cape of Good Hope, and the settlements of Demerara, Essequibo, and Berbice, on the continent of South America.

By the treaty of the 21st of July, the government of the Netherlands accepted, on the conditions therein stated, that sovereignty over the Belgian provinces which the allied powers had offered, not from any peculiar feeling of regard to the interests of King William or of Holland, but as a European benefit, "*de pourvoir à l'établissement d'un état d'équilibre en Europe, et en vertu de leur droit de conquête sur la Belgique.*" The duchy of Luxembourg was not a portion of Belgium, but a part of Germany; and that division was given up to the king of the Low Countries, by the German confederation, of which he was a member, not in his regal capacity, but in consequence of his transferring to Prussia the sovereignties, hereditary in his family, of Nassau-Dittenburg, Siegen, Hademar, and Dietz.

After the union of the two countries had been settled by treaty, and the whole delivered up to the government of William, it was thought necessary to submit, not the union itself, but the fundamental law or constitution, to the acceptance of the people. That constitution had already been accepted by an almost unanimous vote in the northern division, but it was deemed necessary to submit it also to the southern division. An assembly of Notables was accordingly convened in Belgium, on the same plan as had before been pursued in Holland. The number of the members of this assembly was 1600, but not more than 1325 attended. Upon the vote being taken, there appeared to be 529 in favour of accepting the constitution, and 796 against it; and thus, as far as that assembly was concerned, the acceptance of the proposed constitution was negatived. The government, however, took a different view of the subject, founded upon the assumption, that the union being adopted must be considered as a fact not to be questioned; and that this was a question for the united kingdom, which must be determined by a majority of the whole. For this purpose, the statistical view given of the kingdom was thus represented.

The inhabitants of the northern division, or what was before Holland, were.....2,071,181
Those of the south part, or Belgium.....3,411,082

In all.....5,482,263

The votes in favour of the acceptance were stated to be
the whole of the northern part.....2,071,181
Two fifths of the southern part, who voted by
their 529 delegates.....1,364,432

3,435,613

The majority of the Belgian representatives,
who voted for three fifths of that part, amount-
ed to.....2,046,650

Thus giving in favour of the constitution, or }
fundamental law, a majority of.....1,388,963

We have given an account of this proceeding, because it was subsequently made one of the grievances complained of. The assembly had been chosen fairly, and consequently under clerical influence, which was decidedly op-

Nether-
lands.

posed to the toleration of any other party than the Catholic religion. This was proved by a kind of protest, issued under the title of "Jugement Doctrinal des Evêques du Royaume des Pays-Bas, sur le serment prescrit par la Nouvelle Constitution." In an authoritative style it condemns the liberty given to appoint persons of any religious creed to offices of power and trust; and it reprobates the enactment that the Catholic church was to be submissive to the law of the state, that the other religious sects were to be protected in their worship, that the government was to have the power to regulate all the seminaries of the kingdom, and that the liberty of the press was recognised. It concluded with these words: "Mais dès qu'une loi humaine est intrinsèquement mauvaise, et opposée à la loi divine et aux lois de l'église, on ne peut, sous aucun prétexte, s'engager d'y obéir." This declaration was signed by all the prelates, viz. the Archbishop of Malines, and the Bishops of Ghent and of Tournay, and the vicar-general of the chapter of Liège. It is natural to suppose that such a declaration must have had great influence with people so ignorant and superstitious as the lower classes of the Belgian population are universally allowed to be, and averse as they had ever been to a connection with the Dutch, who were represented to them as a combination of heretics. The nobles are also said to have been more attached to the ancient Austrian government; but the middle classes were supposed to have more sympathy with the French than with the German nation, and to be peculiarly jealous of the Dutch.

Whatever may have been the common sentiment, of which it is always difficult to judge, not the least appearance of discontent was displayed at the promulgation of the constitution, or the public entry made by the king and his family into Brussels. His first efforts there, as they had been in Holland, were directed to the means of defence; and all due exertions were employed for the purpose of raising an effective and numerous army. In this much progress had been made when the intelligence arrived that Bonaparte had escaped from Elba, advanced in a sort of triumphal procession through France, and again assumed the imperial title, and all the power connected with it.

The alarm and terror created by this event had the effect of, in a great measure, disarming the power of the ecclesiastical fulminations, and uniting all classes with the new government in preparing for the contest which was evidently about to take place on the frontiers of the kingdom. The time spent by Bonaparte in Paris in organizing his recovered army, and in conciliating the several parties in his capital, was most actively employed by the king in strengthening his means of defence; and a great advance had been made in his military affairs, when it became evident that the first inroad of the French would be on the side of Belgium.

An army composed of Dutchmen and Belgians, but chiefly officered by the former, was collected and led towards the frontiers by the Prince of Orange. When the French entered Belgium, these troops formed the advance of the allied army. It encountered the French at Quatre-Bras, and, aided by the British, resisted during the whole day (the 16th of June) the attacks of the left division of the French army, commanded by Marshal Ney. The loss of lives on both sides was great; but that action had a powerful influence on the issue of the battle of the 18th, as it gave time to bring up the whole of the allied forces, and place them on the field of Waterloo, where the decisive conflict took place which decided the fate of the French empire, and gave a long peace to Europe. During the whole of that day the troops of the Netherlands sustained the character for courage which past centuries had established. There were probably a few instances of overpower-

ing terror, and some solitary examples of disaffection, arising from past associations with the French; but the great principle of public duty pervaded the Netherlands army, as was proved by the loss which they sustained in the battle. The victory was cemented by the blood of the Prince of Orange, who stood at the head of his troops throughout the whole of that arduous day, encouraging them by his cool and determined conduct. On one occasion he made a desperate charge on the enemy, and advanced so far that he was actually in the midst of the French, and in the greatest danger, when a Belgian battalion rushed forward, repulsed the enemy, and, after a desperate struggle, disengaged the prince. From the impulse of his gratitude, and his admiration of the bravery displayed, he tore from his breast one of the decorations gained by his conduct in some preceding action, and flung it amongst the battalion, calling out, "Take it, my lads; you have all earned it." This decoration was eagerly grappled for, and tied to the regimental standard amidst loud shouts of "Long live the Prince," and vows to defend the trophy, in the utterance of which many a brave man received the stroke of death. A short time afterwards, towards the close of the battle, the prince was hit by a musket-ball on the left shoulder. He was carried from the field, and conveyed to Brussels the same evening in a cart, accompanied by two of his aides-de-camp, one of whom, like himself, was badly wounded; displaying to those near him as much indifference to pain as he had previously shown contempt of danger.

The battle of Waterloo appeared at the moment to have consolidated the establishment of the kingdom of the Netherlands. It seemed to have attached the military part of the Belgians to the prince who had been wounded at their head, and who had led them to that victory which they so mainly ascribed to their own exertions, as almost to forget that the troops of any other nation had contributed to it. Advantage was taken of this feeling to commence the working of the new constitution, which had been accepted, as before noticed, by a majority of the whole kingdom, though rejected by a majority of the Belgian portion. The solemn inauguration was held a few weeks after the battle, and much interest was excited by the appearance of the Prince of Orange, on the occasion, still wearing his wounded arm in a scarf, and with the palid countenance of an invalid.

The constitution was then declared to have been accepted by the people, and no allusion was made to the irregularity of the decision, as the objections once urged had arisen from repugnance to religious toleration; those who had urged them being sensible that any allusions to the subject would have been unavailing amidst the prevailing military enthusiasm. None was made, but such were certainly nourished, to be brought forward at some moment more favourable for making the desired impression. No murmurs were heard, and Belgium became, or appeared to have become, reconciled to the arrangement which had been made by the allied powers.

The speedy concentration of the two divisions was a spectacle viewed with astonishment, whilst a thousand channels were opened for the egress of national industry, capital, and enterprise. Every obstacle seemed to have vanished, asperities were softened down or concealed, faction seemed dead or paralysed, and a quiet enjoyment of the present formed the only public manifestation. The people of Belgium appropriated to themselves the glorious victory of which their country had been the theatre. The king, by his love of peace, and by his activity in whatever could improve the institutions and the condition of the country, at first gained a high opinion amongst those Belgians who were able to endure the religious toleration he established; and amongst others his personal virtues, his

Nether-
lands.

Nether-
lands.

domestic habits, and his unwearied industry, as favourable a view was taken of his character as could be formed of one who had the misfortune to be a heretic. This last party was soothed, if not reconciled, by the exertions which he made to recover and restore to their churches those pictures and other objects of value which had been pillaged by the French and carried to Paris.

The naval transaction of the following year, when a squadron of Netherlands ships joined the fleet under Lord Exmouth in the attack on Algiers, was another circumstance favourable to the consolidation of the new kingdom; for although the battle was gallantly fought by Dutchmen, yet the Belgians took care, in the exercise of their vanity, not to allude to the Hollanders; and as they had forgotten the English at Waterloo, so they now gladly assumed to themselves the glory of the united victory. The prosperity of Belgium made it the chosen residence of many respectable foreigners, as well as the place of refuge of others of the most opposite descriptions. The king busied himself less in projects to secure popularity, than in efforts to benefit the country; and it may here be proper to notice the institutions which were either established or ameliorated, and the beneficial consequences they produced.

Under the rule of France, Belgium, like the other parts of the Continent, had suffered severely from the operation of the conscription laws, which had deprived the country of those active labourers who were necessary to cultivate the fields. Although peace could not restore the great numbers who had perished, yet it stopped the farther progress of the evil in the Netherlands, by the establishment of a voluntary enrolment for a small regular army, and of a militia, whose service was required only for one month in the year. The mines felt the benefit of this regulation. The minerals of Belgium consist of coal, iron, and calamine. As soon as the union had been formed, and labourers became less scarce, a great impetus was communicated to this branch of industry; and companies were formed, who were most liberally repaid by the profit of their investments in this branch of industry, which was augmented from year to year as long as Belgium and Holland constituted one kingdom. By the excitement communicated to mining, the provinces of Liège and Hainault, and a part of Namur, were greatly enriched; and a company formed to explore the mines of Luxembourg were amply rewarded in their labours and their profits, till interrupted by internal commotions. The various branches of manufacturing industry received a similar impulse, though at first they were checked by the peace. The continental system of Bonaparte had given a factitious encouragement to some articles of manufacture, which ceased with the return of peace; and, till the formation of the kingdom of the Netherlands, many branches were depressed by the rivalry of foreign goods in the markets to which they had access. But as soon as the junction was completed, a stimulus was given to the manufacturers, by opening to their goods the markets of the East and West Indies, and those of all countries with which the Hollanders had traded. The iron manufactures of Liège advanced rapidly in prosperity; the woollen manufactures of Verviers felt most powerfully a similar impulsion; and many large establishments were formed at Ghent and other places, where cotton goods were fabricated which rivalled those of England, and so far surpassed those of France, that much of the goods were sold by the contraband trade in that kingdom. The opening of the Scheldt was the necessary effect of the formation of the united kingdom. Merchants from various countries formed establishments with large capitals at Antwerp; its docks became crowded with ships from all countries; its warehouses were loaded with colonial and other produce; and it advanced rapidly to a rivalry with Amsterdam, Rotterdam, and Hamburg, in the transit trade to the interior of Germany. The

VOL. XVI.

Nether-
lands.

king directed his best efforts to the state of the roads, the greater part of which had suffered dilapidation, whilst the cross roads, so important in a country chiefly agricultural, were in many places scarcely passable. The management of the former was under the general government, whilst that of the latter was superintended by the local authorities; but in the first few years of the union the whole were repaired and placed in the most excellent state. The interests of internal navigation were sedulously watched over by the king. The old canals were repaired, the shallow parts of the rivers were deepened, and new and important water communications were formed. The chief of these, the Canal Guillaume, which extends from Maestricht to Bois-le-Duc, was an expensive but highly beneficial work; whilst that of Antwerp in Hainault, that of Charleroy in the province of Namur, and that of Ternuse in Flanders, have been found in a very high degree beneficial. Though no longer of any importance to Belgium, it may not be quite out of place to remark, that the spirit of improvement which spread throughout the whole kingdom was to be seen in Holland in the Grand Canal of North Holland, which opens to Amsterdam a way for ships of the largest size to the ocean by way of the Helder, without incurring the risks arising from the shoals of the Zuyder Zee.

Some other plans of this kind had been decided on, when the disturbances broke out which ended in this disjunction of Belgium from Holland. One of these was to make the river Sambre navigable; the other was to form a canal from the Meuse to the Moselle, by means of which the prosperity of the duchy of Luxembourg would have been greatly advanced.

The state of education, from the schools for primary instruction up to the universities, was in a wretched state when the king ascended the throne. In Holland it had ever been an object of the greatest consideration; and it had received from Louis Bonaparte, during his short reign, a degree of perfection which fitted it for reception in Belgium. Normal schools for the instruction of teachers were early founded; and as soon as any were found qualified, they were fixed with moderate stipends in the rural districts where they could be most beneficially placed. To such an extent was this plan of organizing primary schools carried during the first ten years of the reign of William, that their number in 1826 was 3329, in which the pupils were taught reading, writing, arithmetic, and the system of weights and measures. The numbers of pupils in the several schools of Belgium were 156,075 boys and 116,761 girls; in Luxembourg the numbers were 19,925 boys and 14,819 girls.

The schools for higher instruction were improved, and the number of students in them yearly increased. In ten years they had risen from 3400 to 7048. These were in general the institutions in which the youth were prepared for the universities. The king founded a new university at Liège, in addition to the two previously existing at Louvain and at Ghent. Great care was taken to procure the most able men in every branch of science; and as the country was rather deficient in such as possessed eminent qualifications, it was found necessary to repair to foreign lands for help. Several were invited from Germany, and others from France and Italy. No one establishment for education in Europe could boast of more distinguished names than those of the individuals who filled some of the professors' chairs, both in Liège and Ghent.

Whilst in the united kingdom the surface appeared smooth, and the vessel of the state seemed to be making a rapid progress, an under-current was perceived to be making its way in a direction not favourable to permanent tranquillity. At first William gained the highest applause from his Belgian subjects. The whole kingdom exhibited a show of bustling activity, if not of prosperity. Amongst the re-

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Nether-
lands.

fugees from other countries, the king and people were spoken of as models of public and domestic happiness; the diplomatists joined in the flattery, and prided themselves on the skill with which they had accomplished the tranquillity of Europe, by founding the kingdom of the Netherlands; and all united in the assertion that the king was much too good for his Belgian subjects.

For several years this favourable or flattering state of affairs continued, though thoughtful people soon discerned, from events unnoticed by superficial observers, the prognostics of future disunion. At the earliest meeting of the representative house, the different languages spoken by the members caused some difficulties; a Belgian in the discussions speaking in French, and a Hollander replying in Dutch. Too many of the questions brought forward might be of a local nature; and in these, as the whole of the Hollanders voted on one side, and the whole of the Belgians on the other, the decision was often dependent on the accidental absence of an individual on the one side or the other. The equality of numbers between the Dutch and Belgians made it difficult to come to a settlement on such subjects as affected the interests of the two countries in a different or opposite way. This was first exhibited on the subject of a free trade in corn. The Dutch provinces had never produced sufficient corn for their consumption, but a free trade in it had always furnished them with a sufficient supply. The Belgian provinces grew more corn than they consumed. As in the other parts of Europe during the last years of the war, the prices of corn had risen to an enormous rate, and the Belgian proprietors of land had increased their rents in due proportion. With the return of tranquillity the prices of grain and the rents of land were much reduced; and the Belgian members of the assembly desired to impose restrictions on the importation of grain. This was naturally opposed by the Dutch members, whose interest was engaged in favour of low prices, both as regarded the subsistence of the inhabitants, and the trade of the distilleries. The question was finally decided in favour of the freedom of the trade; but the contest gave rise to the formation of two parties, so equally balanced as to make the decision of many legislative questions dependent on accident.

As the royal authority had been established in Holland the greater part of a year before the union with Belgium, it had been organized without reference to that event. Holland had been a shorter period under French power; and during the prevalence of that influence when King Louis filled the throne, its government had been carried on upon the principle of nationality; the fittest men filled the offices in the different departments, and many of them remained unchanged when Holland became a French department. It was natural that King William should continue such men in their offices, and that in selecting officers for the new branches which were to be created, a preference should be given to natives, of whom there were numbers whose education, habits, and patriotism had well fitted them for the public service. At the union of Belgium and Holland the whole administration was in the hands of French functionaries, who speedily disappeared. Few men in Belgium had been brought up in such a way as to form them for official duties, and those who had sufficient information and capacity had been nominated to employments in the distant provinces of France. Under these circumstances, the greater number of officers was necessarily appointed from the northern division of the kingdom. Another cause of many offices in Belgium being filled by Dutchmen was, that some of those Belgians to whom offers were made declined to serve, on account of the influence of the priests, which prevented them from taking the oath to a constitution, one of the first stipulations of which was an equal freedom to all religions.

A complaint was brought forward, that in the appointment of officers in the army an undue preference had been shown in favour of the natives of Holland; and as Mr Northomb, an opponent of the house of Orange, in his work entitled *Essai Historique et Politique sur la Révolution Belge*, has placed the numbers in a statistical point of view, this matter is entitled to examination. According to his statement, in 1830 the officers of the army of the kingdom of the Netherlands is thus shown:

Nether-
lands.

Rank.	Whole Number of Officers.	Belgians.	Belgians settled in Holland.
Generals.....	5	0	0
Lieutenant-generals.	21	2	1
Major-generals.....	50	5	2
Colonels.....	48	8	1
Lieutenant-colonels.	48	9	1
Majors.....	137	19	0
Captains.....	211	38	3
Lieutenants.....	808	115	2
Sub-lieutenants.....	639	82	0
	1967	278	10

This great disproportion is in some measure lessened, from the circumstance that many of the officers were Germans, some were Swiss, and some were natives of other countries. With this allowance, the exact number of which is unascertained, the contrast between the whole and the Belgians is very striking. Baron de Keverburg, a partisan of King William, gives a different account, making the whole number of Belgians in the army to be 536 instead of 278. In his work entitled *Du Royaume des Pays Bas*, he asserts of his catalogue that it is "d'après des renseignements puisés à des sources authentiques;" but, even on this showing, the more numerous population supplied but one fourth of the officers. This is accounted for, if not justified, by the baron, on various grounds.

When Louis Bonaparte became king of Holland, he sedulously attended to the formation of his army; and when he abandoned the throne the armed force was so well trained, equipped, and officered, that, on the annexation of Holland to France in 1810, it formed a military body equal to any other of the empire in its adaptation to the purposes of war. When that army was transferred to France, the different grades of officers retained their Dutch rank, and their former course of promotion. But when the people of Holland rose against France, and raised William to the throne, the Dutch resigned their posts in the French service, and repaired to their own country, where they were gladly received, and reinstated in the rank which they had attained during their service in France. It will be seen by the list of Mr Northomb that all the generals were Dutchmen; but that rank had been acquired in the French service, where, by their military talents, they had gained high reputation, and had been honoured and trusted by the French emperor. The names of the Dutch officers thus appointed generals by William are well known. Tindal had been raised by Bonaparte to the rank of general, and commanded a regiment of his body guard. Jansens had been distinguished as governor of Batavia, and in the army of the French emperor on the Ardennes frontier. Daendels was one of those Dutchmen who had been always placed in posts of the greatest danger, and had displayed the highest skill and valour. Dumonceau, though a Belgian by birth, had by his long service in the northern provinces become a Dutchman, and was highly esteemed in the French army. Chassé, an old officer of

Nether-
lands.

Holland when he was transferred to the French service, became known by the familiar title of *Général Baïonnette*, and afterwards distinguished himself by his gallant defence of the citadel of Antwerp.

When men like these returned to their liberated country, and at a moment when their services were wanted, there were no rivals to compete with them in Holland, and they were necessarily placed at the head of their profession. Those of the successive ranks who also returned, as almost the whole did, were retained in those ranks in the army, formed first in Holland, and afterwards strengthened by the addition of Belgians. The Belgian officers serving in the French army had not been kept apart, but mixed up with the Frenchmen. They had formed a part of the general conscription; few had raised themselves to the rank of officers; and of these only three had attained the grade of colonel, no one having risen higher. Being thus insulated, they had nourished little or no national feeling; some few tardily returned to their native country after the occupation of Paris; but many of them remained in the service, and fought against their country at Waterloo.

The king, in the hasty organization of an army, naturally availed himself of the materials within his reach, and adapted them to the emergency. When after the battle of Waterloo peace was established, it would have been highly unjust to the brave men who had assisted there not to have confirmed them in their ranks, or to have placed others over them merely because they were born in Belgium. But for these, and even for such as had fought against their country, and repaid to it after the victory, the provision made was the best that could be effected at the time; and they were subsequently placed in new corps, retaining their former rank and seniority.

The utmost economy was practised respecting the army; and from the number of good officers in the highest classes, and their seniority, there was no prospect of rapid promotion. Thus the gentry of Belgium had but little inducement to enter the military service, so that, without attributing to the king any great partiality, the facts here stated sufficiently account for the greater number of officers belonging to one division of the kingdom.

The other charge of partiality on the part of the king, which ultimately became one of the grievances, was, that, in the legislative body, the number of deputies was as great from the northern as from the southern division of the kingdom, although the number of inhabitants in the latter was so much greater. The foundation of this settlement of the relative numbers was based upon the principle of giving legislative power according to the rate of revenue to be extracted from each division, rather than according to the number of the population. The proportion of revenue raised in Holland was nearly equal to that raised in Belgium; indeed it was shown, at a subsequent period, to be as fifteen to sixteen. The rate of revenue per head in Holland was sixteen florins, and in Belgium ten florins. Whether the rate of revenue or the number of inhabitants be the proper scale for regulating the proportion of legislators, is not a subject to be discussed in this place.

In the distribution of the higher civil offices of the government, complaints were urged and magnified into weighty grievances by the Belgians. On this subject the statements of Baron de Keverburg, when confirmed by the official part of *L'Almanach Royal*, are as follow:

The cabinet consisted of six members. It was formed before the union of the two countries, and was composed wholly of Hollanders; but after the junction of Belgium, two of the members withdrew, and two Belgians were admitted in their stead. The first chamber of the states-general, similar to our House of Peers, but nominated by the king for life, contained fifty-six members, of whom

Nether-
lands.

thirty were Belgians, and twenty-six Hollanders. The *Conseil d'Etat*, or privy council, was composed of twelve Dutch and eleven Belgian members. The Prince of Orange and his brother Prince Frederick presided over the two divisions into which it was formed; one for the direction of the army, the other for that of the naval force. The *Chambre des Comptes*, or treasury, consisted of sixteen persons, taken equally from the two divisions of the kingdom. The judicial authority of the provinces and communes was in general intrusted to persons chosen in the division in which they were to execute their duties. There were a few exceptions to this rule, for two Dutchmen exercised these functions in Belgium; but two also, natives of Belgium, filled the same offices in Holland. Thus far there was an equality; but in North Brabant the judicial office was filled by a Belgian, which gave a trifling superiority to the southern division.

It may fairly be presumed, that in the appointment of officers in the several civil departments, the king had been mainly influenced by his view of the capacity of the persons selected to discharge the necessary duties; for at a subsequent period, when the most scrutinizing activity was exercised to discover grounds of complaint, no accusations were made of any other fault in the appointments than that which related to the portion of the kingdom to which the functionaries belonged. The king himself was active and regular; and being in a great degree his own prime minister, he must have been peculiarly anxious that the persons under him should be adapted to their several stations, and certainly under no government was more industry exercised or more regularity preserved.

Many of the important institutions of the country had, by the constitution, been left to the will of the king as to their local establishment. The seat of the states-general had been fixed by that law to be alternately in Belgium and in Holland, but not the place for the king's residence or the council of state; yet these also, though with some personal and political inconvenience, were made changeable, business being transacted six months of each year at Brussels and six months at the Hague. But the supreme court of justice, the court of appeal from all the inferior tribunals of the kingdom, was permanently fixed at the Hague, to the great disadvantage of the more numerous suitors in the southern part of the kingdom. This formed a material, and apparently a just cause of complaint; and nothing has been stated by the Dutch which has disproved the inconvenience, though attempts have been made to represent the practical injury arising from it as very trifling and insignificant. Several other establishments were also made permanent in Holland, such as the state archives, the diplomatic offices, the council of the nobles, the coinage of money, the military and naval boards, the academies for the instruction of naval, artillery, and engineering officers, and the principal naval and military arsenals. This arrangement was justified upon public grounds by the partisans of the king. The kingdom, they affirmed, had been established as an European object, and to form a barrier for the defence of all the powers against the ambition of France. In any display of that ambition, Belgium would, as heretofore, become the first theatre of war, and, in spite of the range of fortresses about to be erected, might be occupied by an invading army. If the means of carrying on the war fell into the enemy's power, the effect might be fatal; but by having the establishments farther from the frontiers, and where they could be guarded by natural defences, the war might be kept up effectively behind the rivers and canals of Holland, so as to render the advance of the enemy a dangerous or a ruinous step.

There are in Belgium a variety of languages spoken, and the attempt of King William to introduce one uniform tongue created much discontent, and was by a great and

Nether-
lands.

influential part of the inhabitants considered as a serious grievance. The far greater portion of both the northern and southern inhabitants are of German origin, and their vernacular language is chiefly composed of Teutonic words. It is divided into several idioms, namely, the Dutch, the Flemish, and the Brabant. These three are so nearly similar, that those who use them understand each other better than the English and Scotch peasantry do. The Dutch language has been more polished than either of the others, having been the tongue of some of the most learned men that Europe has produced. It contains books of art, science, literature, law, theology, and history of the greatest merit, and which have been the means of spreading knowledge of all kinds to a great extent. The care bestowed on education has produced a greater number of readers and writers than are to be found in any other country of the same limited population. The Flemish and Brabant dialects have been little cultivated; few books have been written in it, except those of devotion, the lives of saints of the Catholic church, almanacs, and spelling-books. The numbers who read them are very small in comparison of the whole population, but with the rural inhabitants this dialect is the general medium of intercourse.

During the French dominion great pains were taken to extend the use of their language, and with much success as far as regarded those who had enjoyed the advantage of even the commonest education. This has extended the use of that language amongst those above the lowest classes; and it is said that even in Holland there are more persons acquainted with the French tongue than in those parts of Belgium where the other dialects of Teutonic origin are used. The Walloon language, a corrupted dialect of the French, is commonly used in the provinces of Hainault, Liège, and Namur; and the German language is most prevalent in Luxembourg.

Baron de Keverburg, assuming the population of 1829, gives the statistics of languages as follows.

The divisions in which the German is used, and their population:—

In Holland.....	2,329,974
In Belgium, the provinces of Antwerp, Lim-	
bourg, and the two Flanders.....	1,971,056
The largest part of Brabant.....	380,177
One half of Luxembourg.....	151,317
	4,832,524

The divisions in which the French and Walloon are used, with their population:—

The provinces of Hainault, Liège, and Namur...	1,124,595
The arrondissement of Nivelles, in the province	
of South Brabant.....	126,733
One half of Luxembourg.....	151,317
	1,402,645

In this view the Dutch language is used by two fifths of the population, the other languages of German origin by two fifths, and the French and Walloon by one fifth. From the most remote periods all public affairs in Belgium were transacted in one or other of the Teutonic idioms. The *Joyeuse Entrée*, the Magna Charta of the country, was originally drawn up in the Teutonic dialect, and was only translated into French at a recent period, when the princes, no longer residing in the provinces, began to give a decided preference to that language; but all the proceedings of the states of Brabant were conducted in it till the conquest of the country by France. From that moment all public deeds were written in French, and the subdued people supported with pain the loss of their native tongue; but they dared not utter a complaint. This attachment of the Belgians to their native language was shown to have been little weakened by their subjugation to France; for when the al-

lies had freed them from that yoke, and Baron Vincent was appointed governor *ad interim* by the house of Austria, a petition was presented to him by the ancient representatives of the city of Brussels, who resumed their former titles under the name of *Syndics des neuf nations, et des cent quarante-trois doyens*, complaining of the compulsory use of the French tongue. The petitions were favourably received, and an arrêt issued on the 18th of July, authorizing the use of the Flemish language, not, indeed, in all public writings, but in all notarial writings.

When this provisional government ceased by the accession of King William to the throne of the Netherlands, he proposed to redress what was then deemed one of the grievances of the country, by a decree of the 1st October 1814, which stated as a fact, "that, in consequence of the union with France, the national languages of the provinces had been almost suppressed, to give place to the French tongue;" and then added, "that if it was necessary on one side still to tolerate the use of the latter language in some parts where the Flemish is not used, it is but just, on the other side, that the Flemish, which is the natural language of the country, should be re-established in all the parts in which it is used and understood." The king was certainly desirous of restoring the national language, and of restraining the use of the French; and for a time, whilst it was gratifying to the great body of the people, it occasioned very little complaint upon the part of those who alone spoke or understood French. Gradual enactments were made to induce practitioners to study the national languages; and three years were allowed to acquire them, at the end of which time those who did not understand them were to be removed to other stations, where they could practise their official duties in the tongue they were most familiar with. At the expiration of the prescribed time, 1st of January 1823, a decree fixed the following arrangement on the subject of languages:—1. The use of the French language shall be preserved in the Walloon provinces of Liège, Hainault, and Namur. 2. The use of the Dutch language shall continue to be maintained in Holland. 3. The use of the Flemish language, in its several idioms, shall be re-established in the Flemish provinces. 4. The German language shall be used in the German part of the grand duchy of Luxembourg. In short, it was provided that the official language in each of the provinces should be that which was used and understood by the mass of the people who inhabited them.

The profession of the law in Belgium forms a body which, next to the clergy, is the most formidable body of any. They had been trained by the study of French eloquence, and the young advocates, when called upon to plead in the language of the country, were often mortified by the ridicule of the audience. They did not wish to incur the displeasure of the Belgians by degrading their language, and therefore directed their attacks on the Dutch language, which, for that purpose, they confounded with the Flemish. In these attacks they were joined by the writers of many pamphlets, and also those of the public journals. The attacks were very violent. From those on the Dutch language they passed on to attacks on their literature, on their manners, and their morals. The Dutch writers, irritated by these attacks, replied and defended themselves; and thus arose, from mere literary disputes, a powerful and enduring animosity between the two countries.

The subject of religion was one which, above all others, served to produce discontent. A set of writers who neither had, nor pretended to have, any religious principles, encouraged the government at first in measures of toleration, according to the fundamental law, and were, or affected to be, vehement against the Jesuits, who opposed it. William was no bigot in religion, but it was his desire to raise the character of the Catholic clergy, by imparting

Nether-
lands.

Nether-
lands.

to them a more extensive and better education than had previously been necessary before entering on their office. With this view he framed regulations which offended the clergy and the ignorant party who submitted to them, and who were at length joined by those who distinguished themselves as liberals, as soon as they saw that some advantages could be drawn from that union to forward their own republican views.

The Catholic clergy in Belgium had submitted to the regulation of their affairs which French subjugation had imposed. The vicar of the diocese of Ghent has indeed been unwilling to allow this; but Baron de Keverburg, himself a Catholic, and under the French regime governor of West Flanders, asserts most positively that the imperial institutions were observed in Belgium as elsewhere; that the catechism of the empire was taught to almost every one; and that the four articles of the clergy of France formed a part of the religious instruction in all the Belgian departments. As soon as the kingdom was established, they brought forward claims to power which they dared not even to whisper under Napoleon, and even carried those claims to an extent beyond what they had been urged for the last three or four centuries, and beyond what are acknowledged in the Catholic kingdoms of Europe.

The vicar-general of Ghent had required, as essential to the establishment of the kingdom of the Netherlands, "le rétablissement de tous les articles des anciens pactes inauguraux, constitutions, chartes, et cetera, en ce que concerne, non seulement le libre exercice de religion Catholique, mais aussi les droits, privilèges, exemptions, et prérogatives des évêques, prélats, des maisons-dieu, et des autres institutions religieuses quelconques." A single exception was indeed admitted to this exercise of power. The church would indulge the monarch so far as "accorder au prince et à sa cour des chapelles, bien entendu seulement dans l'enceinte des palais royaux." Thus these old powers, which the French had destroyed twenty years before, were to be restored; and then the prelates would allow, but only to the king and his family, the toleration of his own worship in secret. According to the principle of the prelates, the chief and sole duty of the temporal power was, in its relation to the Catholic church and its clergy, limited to "protéger la religion et ses ministres, à faire exécuter les lois de l'église, à faire punir les actes extérieurs nuisibles à la société religieuse."

This extraordinary claim of the church to a power independent of, and in fact governing the state, would not, on its own account, have deserved the notice here taken of it. It was at least quieted by the prudent conduct of the king, who suffered the Count Mean, one of the prelates, upon his nomination to a seat in the council of state, to swear to the tolerating constitution under a protest, that if the pope should declare the oath to be contrary to the rights of the church, it should thereby cease to be binding. The king, whilst he adhered to the constitutional principle of tolerating other sects, extended his liberality to the Catholic clergy, by increasing the stipends of the inferior orders; by making provision for those who, from age or infirmity, were incapable of performing their duty; and by contributing liberally to the erection or repairs of churches where the communal funds were inadequate to the purpose. The opposition of the clergy was for a time dormant; but it was again roused, when, at a subsequent period, the leaders of the church formed a junction with the leaders of the French party, and thus placed the lower classes, who could not read their effusions, but were under the influence of the priests who spoke to them in Flemish, in a state of hostile excitement towards the government. The hostility of the clergy was much aggravated by the attempts made to improve the education of the priests. The king had determined that no priest should be inducted who had not

Nether-
lands.

passed two years in the study of the *literæ humaniores* before his ordination, and appropriated a college at Louvain for that purpose, to which was given the unfortunate name of the *philosophical* college, a name with good Catholics almost equivalent to infidel or heretic. The prelates, to counteract this, established seminaries connected with the cathedrals, in which the pupils were instructed in their humanities. These contravened the design of the king, and were forcibly shut up. It was an objection to the philosophical college that the professors of history were not priests, but laymen, and some Protestants. This may not seem a solid ground of declining to attend lectures on history; but it was so with the Catholics; for, as their doctrines rest quite as much on tradition as on the Holy Scriptures, it was of vast importance that history should be taught by those alone who were orthodox in their opinions. In truth, the critical spirit of some of the German professors would make sad work with many parts of the traditions held sacred by the Catholic church. The prelates, in the discussions on this subject, indulged in language of a violent kind, and were prosecuted. A law enacted by Napoleon was made the instrument of condemning one or two of them to banishment, and excited no small degree of hatred amongst their adherents, who, if not the most enlightened, were the most numerous, portion of the inhabitants. These mortifications were increased by circumstances of inferior importance. Some of the religious festivals were curtailed, certainly with no views inimical to religion, but to benefit the morals of the people, by lessening the number of days that were devoted to idleness and drunkenness. The architecture of the national schools was similar to that of the reformed places of worship, and the youth of the country were forbidden to be educated out of the kingdom. These trifles were magnified into matters of plain evidence of a regular system to proselytise the whole of the Netherlands. Whilst these controversies respecting religion and education were carried on, the conduct of the king was applauded and encouraged by the active party of the liberals, who represented them as proper steps to secure the people from the insidious attempts made by the Jesuits to blind and cajole them. There was no evidence of any plan of the kind on the part of the Jesuits, and it was only affectation in the liberals to insinuate it. It served their turn for the time, but was soon forgotten, when it appeared advantageous for their party purposes to join with the most bigoted of the Catholics against the government of the house of Orange.

Another subject was at times brought forward, and must be added to the causes of the internal disunion between the two parts of the kingdom. The number of members of the representative body had been fixed at the time of the union, and made equal for Holland and for Belgium. The subject was then investigated with the greatest deliberation, and all parties were content. It had been suggested that Belgium brought, to form the kingdom, a more numerous population than Holland, and therefore ought to have a greater proportion of members in the assembly. But, upon the other hand, it was shown that the colonies which Holland brought to the common stock contained, in Asia, Africa, and America, as many persons as rendered them equal in number, and, in regard to common advantage, much superior to Belgium; and, besides this, it was urged, that the Dutch contributed to the common cause a powerful fleet and an army, with the stores belonging to both services. This point was, however, settled with perfect cordiality, and remained at rest during several years. But at length it was thought necessary to extend to Belgium the Dutch system of taxation on the grinding of corn. This was severely felt, and gave rise to renewed agitation as to the inequality of representation in reference to the numbers of inhabitants. It became a more prominent

Nether-
lands.

object, because the tax was imposed only by a majority of two votes, all the Hollanders voting for the measure, and all the Belgians but two against it.

During the whole of the period from 1815 to 1829 the popularity of the monarch was very variable. After the uttering of some loud complaints, as alleged grievances arose, they seemed to die away and be forgotten; and, till some new cause supervened, the king was as much respected as his best friends could wish. At no time, indeed, was his personal character assailed; and the general feeling in Belgium was, that he always meant well, but gave too ready an acquiescence to what they tauntingly called the schemes of their *Dutch cousins*.

The king, attacked by two parties, by the priests and their bigoted followers on one side, and by the republicans on the other, avowed his intention to act with indifference to all parties in the pursuit of what he deemed for the general advantage. In conformity with this disposition a *concordat* was in 1827 entered into with the pope, by which the right of nomination to the bishoprics was settled. It was provided that each should be selected by the pope out of three individuals to be nominated by the king, and that the education of the priests should be under the control of the prelates; but that in the seminaries professors should be appointed to teach the sciences, as well as what related to ecclesiastical matters. This arrangement was highly satisfactory to the cool and thinking part of the community, but was far from pleasing to the extravagant partisans. The clergy thought that too little had been granted to them, and the liberals that too much power was conferred on their order. Conciliatory as this measure was intended to be, it thus proved nugatory; and several nominations of Belgians to offices before filled by Dutchmen had no better effect.

Brussels at this time contained a most heterogeneous foreign population, consisting of the intriguing and discontented subjects of almost every country of Europe. There were of Frenchmen, regicide conventionalists, exiled Napoleonists, and proscribed constitutionalists, besides Italian carbonari, expatriated Poles, Spanish liberals, disgraced Russians, English and Irish radicals, and visionary students from the various parts of Germany. As the greater part of these had but insecure means of subsistence, and for the most part understood the French language, the press groaned with libels, not more against the Belgian than against all other governments, and thus contributed towards the production of a high state of political excitement. The press of the capital also furnished cheap editions of such works as, either from their irreligious, immoral, or democratic tendency, were prohibited in France; and thus became a nuisance to the regular governments of Europe. The great mass of the population could not be inflamed by these fire-brands; few of them could read, and fewer still could read French. They were, however, acted upon by other means. The Flemish preachers, schoolmasters, and confessors, in their several spheres, were ready to join in any movement, and were sure to be supported by the idle, the dissolute, and the indigent, with which the cities and large towns abounded. To bring the whole body of discontent to bear upon the same point, it was found advisable to form the two parties into one; and this was achieved by the liberals affecting a zeal for the Catholic faith, which they had before treated with contempt and ribaldry. The union was thus formed, meetings of the parties were held, the junction was openly announced, and threatenings were promulgated tending to give confidence to the confederacy, as well as to excite apprehension in the king and his ministers.

This system of agitation was carried to an extent which no government could behold with indifference, however confident in the rectitude of its measures. It was attempt-

ed to oppose the calumniating writers by employing others to counteract their influence; but the attempt was far from successful, as in that kind of warfare the assailants have almost always the advantage on their side. The avowed object of the liberal writers was to urge the clerical party to make such extravagant demands of extensive power as they knew, if granted, would be the ruin of the royal authority, and if refused, would increase the agitation they had already created. Although the whole of the Dutch members of the representative assembly, and several of the most respectable of the Belgian members, gave a majority in favour of the royal party, yet many of the latter adopted most inflammatory language, and, as far as the rules of debate allowed, seconded the views of the united party of the liberals and bigots.

As the union openly flung defiance at the government, it appeared necessary to bring before the courts of law the most notorious of the inflammatory writers; and two were selected as subjects for prosecution before the court of assizes of South Brabant. These individuals are thus described by the Baron de Keverburg. Of the first, Louis de Potter, he says, "Il s'était fait remarquer longtemps avant les troubles de la Belgique par des écrits qui, aux yeux de l'église, étaient réputés fort impies, et, aux yeux des hommes doués, d'un peu de délicatesse, de très-mauvais gout. Ce que j'ai de dire sur le second est moins honorable encore. M. François Tielemans, avant l'époque pré-indiqué, n'était connu que par les bienfaits qu'il avait reçus et qu'il continuait de recevoir du roi, et plus tard il le fut par son ingratitude envers son bienfaiteur."

These men, with two others, likewise editors of journals, were sent to the tribunal in which Van Maanen filled the office of presiding judge. The prosecution terminated in a sentence of banishment from the kingdom for the period of eight years; a sentence which brought on the judge the execrations of the libellous journals, and elevated the prisoners to the rank of martyrs. The sentence was put in force by sending the culprits to the frontiers, where they were detained, as neither of the neighbouring states would admit them. The revolution of July occurred in Paris whilst they were in this state; and the party which prevailed in that city allowed them to enter France, and they were received in the capital with great applause by the propagandists.

The popular mind in Brussels was highly agitated by these trials, which did not operate to restrain the indignant language of the journals, nor the distribution of the most vehement placards, many of them in the Flemish tongue, in which the minister Van Maanen, and the editor of a royalist journal entitled the *National*, were held up to the public indignation, and threatened with vengeance. In this state of the public feeling, the news of the success of the Parisian mob in overturning the throne was received with enthusiasm. Numbers of the young propagandists from Paris reached Brussels. Assuming to themselves the character of heroes of the revolution, and with feelings of disappointment at the tranquil issue at which it had so soon arrived, these young men displayed the three-coloured cockade in the streets and public places; talked loudly in the theatres and coffee-houses; sang the Marseillaise and Parisienne hymns in chorus with impassioned groups; and dwelt with enthusiasm on the glories of the republic and the empire, and the future destinies of their "young France." Some of the more active of the Belgians repaired to Paris, and are said to have sounded the new government on the subject of the re-union of their country to France, in the event of the dissolution of the monarchy of the Netherlands. These last were, however, mere adventurers, who had little or no power over, or intercourse with, those who were destined to influence the fate of Belgium.

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The disturbances which followed at first may be easily concluded to have been the result of mere popular excitation, such as is often seen in large cities. The first symptom of outrage was presented by the audience of the theatre, on the 25th of August 1830, after the representation of a piece, the *Muette de Portici*, which abounded with passages well calculated to kindle a flame amongst materials well charged with inflammable particles. When the curtain fell, the excited audience rushed into the street, exclaiming, "To the office of the National." They ran thither, soon forced in the doors and windows, and began the work of destruction. They then rushed into the dwelling of the editor, which was speedily demolished, though the obnoxious individual, whose life was threatened, made his escape unhurt. The house of Van Maanen was that next assailed. It was plundered, and then set on fire, and the populace stopped the fire-engine from playing till every thing in it was consumed. The police-office was then attacked; the books, furniture, pictures, and plate of the chief magistrate were brought out and burnt in the street; and the hotel of the provincial governor shared the same fate; whilst some private houses and several manufactories were pillaged, and otherwise much damaged. Fury, confusion, or terror were visible in every countenance, before the civil and military powers made any attempts to stop these disorders; and those which were made showed a want either of the courage or the coolness necessary to act with decision. "From this conduct," says an eye-witness, "before ten o'clock on the morning of the 26th, the guards and posts in the centre of the city had been overcome, or had tranquilly surrendered; and the troops who had been drawn out either retreated to their barracks, or were withdrawn to the upper part of the city, where they piled their arms in front of the king's palace, and renounced all attempts at suppressing the tumult."

By the operations of these two days, the multitude had in fact gained the mastery of the city, and every one in it felt himself exposed to whatever private malice, political fury, or the love of plunder, might induce the populace to inflict. This moved a few of the more influential inhabitants to take up arms, and to enrol themselves into a burgher guard, for the protection of their lives and property. Within three days, not less than as many thousand persons, chiefly heads of families, had enrolled themselves in this corps, and, under chiefs of their own selection, paraded the streets; so that, if they did not put a stop to plunder and destruction, they at least contributed in some degree to contract the extent of the mischief. In such circumstances, the actual power within the city devolved on those who obtained the direction of these hastily organized and scarcely armed citizens. They determined on resisting the troops, which were advancing; and the general who commanded them having no precise orders from the king to act, readily agreed to suspend the march, and entered into a kind of treaty of neutrality with the burghers, till they could receive directions from the Hague, where the king and his family had that year their residence. The intelligence of these events in the capital soon spread throughout the provinces, and in all the large towns, excepting Antwerp and Ghent, similar scenes were exhibited, commencing with plunder and outrages by mobs, and settling down into an uneasy but rather more secure state by the institution of burgher guards.

The intelligence from Brussels was quickly communicated to the Hague, but the royal councils were divided in opinion. The only positive demand in Brussels was the dismissal of the minister Van Maanen; and he offered to resign his post. The king is said to have refused accepting his resignation, whilst the Prince of Orange urged the acceptance of it, and the adoption of some other measures of a conciliatory kind. The result of the decision can only

be known by the events which followed; and they show that neither the adoption of concessions, nor the positive use of force, was resolved upon, but a course was pursued which, being some undefined medium between the two different paths, ended, as was natural, in converting a mere popular riot into a confirmed revolution. It was determined by the council that the Prince of Orange should proceed to Brussels on a peaceful commission; whilst the command of the army was conferred on his brother, and the troops advanced with alacrity from the various parts of Holland, where they were quartered, and where the most astonishing zeal was displayed in support of the royal authority.

The prince, however, departed for Brussels, but only furnished with such limited powers as, in the actual circumstances, were utterly ineffective. On his arrival at Vilvorde, near the city, he was waited on by a deputation from the city, composed of some of the most respectable inhabitants, who had been nominated at a public meeting of the householders. After some preliminary discussions, the prince courageously resolved on entering the city with no other suite than a few officers of his staff. His passage through the streets, crowded with the irregular burgher guard, and a ferocious mob, was attended with imminent risk; but at length he reached his own palace, and commenced a conference. Discussions were continued for several days between the prince on one side, and respectable citizens on the other, which were conducted with firmness and in a conciliatory spirit by both parties. The substance was not a rejection of the royal authority, or of the reigning dynasty, on the part of the citizens, but a separation of the administration of Belgium from that of Holland. They all declared that no wish prevailed for any union with France, but only for such a kind of independence for both countries as had been fixed between Sweden and Norway, with which both countries were satisfied and benefited. It was more than intimated to the prince that the wishes of all Belgium would be fulfilled if he were elevated to the throne; but in answer to such suggestions he firmly asked of one of the most influential men both at that and the present time, "What opinion would you entertain of me were I to sacrifice the interests of my father to my own? What confidence could you repose in a man who could cast off his allegiance to his king, and that king his father, merely to gratify his own ambition? I also am a father," added the prince with deep emotion, "and am bound to show a proper example to my children. Posterity shall not revert to my name, and revile me as that disloyal Nassau who tore the diadem from his father's brow to place it on his own."

At a final meeting held on the 3d of September, when many members of the states-general attended, it was so fully obvious to the prince that nothing but a separate administration of the two countries would restore tranquillity, that he resolved to use his influence with his father to accomplish that object; and he received the fullest assurance from the persons present, that they would unite in the most efficacious measures to assure the dynasty of the house of Orange, and to protect the territory of Belgium against any attempts to subject it to France, or any other foreign power. The prince expressed his determination to use his most powerful arguments with his father to obtain his assent to this proposal; but expressed his apprehension that he should be unable to succeed in his endeavours. The prince then quitted the city, carrying with him the respect of all those with whom he had communicated, for the courage he had displayed, for the knowledge of public affairs which he discovered, for the cool judgment which he exercised, and, above all, for the sense of parental duty which he had manifested. Whilst these transactions were passing in Brussels, the whole country was in a flame; in every town the populace were triumphant, and indulged unre-

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strained in plunder, to which, especially in the important city of Liège, was added the conflagration of several valuable manufacturing establishments. The officers of the army, with no definite orders how to act, were paralyzed in some places, in others gave up their arms, and in others engaged to be neutral.

The king, amidst the general disorder in Belgium, and the most fanatical attachment to the royal cause in Holland, had summoned the states-general from both divisions to assemble at the Hague. The members from Belgium, with some slight hesitation, resolved to repair thither, and the assembly was opened on the 13th of September, by a speech from the king, which was firm and temperate, but by no means definite. The proceedings of this body were dilatory; the Belgium members were treated with indignity and insult by the populace; and the language of some of the Dutch members expressed vengeance rather than conciliation. The accounts received at Brussels from the Hague, and the warlike demonstrations made by the troops, rekindled and accelerated the preparations for defence, and induced some approaches to organization. The burgher guards had become tired of military duty, and being mostly tradesmen living on their business, which had now been ruined, they were anxious for the return of the tranquillity upon which their existence depended. The leaders of the opposition, however, drew fresh recruits of a more determined and more reckless description from the rude population of the Walloon provinces, from the men employed in the coal and iron mines, and from the iron forges and other works which had been destroyed or shut up in and around Liège. These were, in a great measure, old and hardy soldiers, who had served in the ranks of Bonaparte's army, and fought in Germany, in Russia, or in Spain. Their arrival in the capital spread terror amongst the peaceable inhabitants, and kindled alarms lest they should be again exposed to the outrages which had marked the first days of the explosion. The defenders were thus divided into two parties; but, as usual, the most violent soon prevailed; and the council of the rabble soon dispersed that of the burghers (for both had their separate assemblies), seized the arms of the latter, and added to them others which had been collected in different parts of the country.

Although the states were still sitting at the Hague, the king's army was gradually drawn around Brussels. It consisted of 14,000 well appointed troops, under the command of Prince Frederick. But the motions of this powerful body were so dilatory, and its whole operations so unmilitary, that they are difficult to be accounted for, unless on the supposition that the conduct of the king was too conciliatory when force should have been applied, and too hostile when conciliation would have been of most advantage to his cause. On the 20th of September the council resolved to take possession of Brussels, and orders were sent to Prince Frederick to that effect. This resolution was taken at the Hague in consequence of the information of numerous emissaries from Brussels, who represented the inhabitants as eager to receive the troops, and to assist in putting an end to the anarchy and oppression which the mob were exercising. The most respectable names in the city were appended to these representations, which were doubtless sincere, but came from such as were more prepared to enjoy the return of peace and good government than to contribute any share of their personal services to secure these blessings.

On the 25th, the troops advanced towards the city, and with little opposition occupied the upper portion or court part of it, which is situated on a hill, by which the whole of the rest of the town is commanded. The opponents in the lower part of the city were dispirited and disunited, and most of the more violent leaders had fled. But the

commanders of the army seem to have been seized with a panic, or to have dreaded doing too much mischief to the houses and property of the more wealthy inhabitants. In the square, where the troops had been drawn up, they were exposed to a galling fire from an invisible enemy, who, from the roofs of the houses, and from the cellars, picked off the officers and men without being much exposed to any return from the troops. Instead of destroying the houses and buildings which concealed the assailants, the prince had recourse to unavailing negotiations, and, after three days of most harassing service, determined to withdraw his troops. He had the means of stopping all supplies from entering the city, and thus of effecting a surrender by starvation; or, by a bombardment, he might have easily enforced submission. Why neither of these means were adopted cannot be certainly known; but the friends of the royal party attribute it to humanity alone. The loss of lives was not very great on the side of the king's troops, considering their exposed situation, and the number engaged. It is stated in the returns as 138 killed, and 650 wounded; whilst of the defenders of the city, though far inferior in numbers, the casualties were acknowledged by themselves to be 450 killed, and 1250 wounded. This disparity must be considered as one of the many extraordinary circumstances of the transactions, and renders the result utterly incomprehensible. The incredible intelligence of this repulse was rapidly conveyed to the provinces, with great exaggerations; and disaffection, anarchy, and demoralisation were spread everywhere. The army retreated towards Antwerp, which, in spite of the force near it, soon became involved in confusion. Ghent, Bruges, Ostend, and the other towns in that direction, immediately became a prey to the revolutionary party, and experienced the horrors of anarchy in the destruction of some of their most extensive manufacturing establishments. The universal rejoicing of the Belgians did not prevent some measures from being adopted to restrain outrages. In a few days, some individuals, with the general acquiescence, formed themselves into a provisional government. They were for the most part men of character and property; but amongst them was De Potter, who had returned as soon as the danger was over, and had been placed by the popular feeling at the head of the body. His power was but of short duration, and he soon fell into utter insignificance, if not contempt, as did others of the original leaders of the insurrection. When those of the representatives who had assembled at the Hague returned home, and their conduct was reviewed in a dispassionate manner, the weight of their character gave them an influence which proved favourable to the return of order. Some of them were added to the body forming the provisional government, and they exercised their influence with prudence, firmness, and integrity.

In the provisional government the state of parties was singular, from the variety of opinions. De Potter, who looked forward to the dignity of president, advocated a republican form of government; Gendebear, a decided advocate of democracy, preferred a union with France; whilst Van de Weyer wished for an independent government, on a monarchical basis, with the Prince of Orange at the head, if he would consent to withdraw altogether from his Dutch obligations, and become exclusively the sovereign of Belgium. The plan of Van de Weyer was known to be favoured by all the kings of Europe; and even France, at that moment under the pilotage of Lafayette, was averse to the entire exclusion of the Nassau dynasty, and sent an agent to Brussels to forward his views. Gendebear had visited Paris, and there found little or no disposition amongst the leading people to agree to a union with the Belgians, which, they were aware, would involve them in a war with all those powers that had founded the kingdom of the

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Netherlands in 1815, solely as a European object and a barrier against France.

It soon became evident in Belgium itself that republicanism had made little or no progress. The prevailing opinion was strong in favour of the Catholic religion, with all its ancient powers and observances, but stronger still in favour of a nationality independent of all foreign control. This latter spirit contributed to increase the number of those who had taken up arms; and by such persons the repulse of the Dutch at Brussels was vainly considered as an evidence of the military power of the people. Many of the privates, and a few Belgians of distinction, had been in the army of Prince Frederick; but they soon left his colours, and entered the ranks of their countrymen. The Belgian colours waved on every tower in the country, except those of Antwerp and Maestricht; when the Dutch army, greatly reduced in numbers as regarded subalterns and privates, but with the artillery in complete order, withdrew into their own territory.

The council of the king at the Hague resolved on the separation of the two governments into different administrations; but it was then too late to produce reconciliation; and an attempt made by the Prince of Orange to procure for himself the supremacy of Belgium had no other effect than to beget contempt in that country, and to draw upon himself the temporary suspicion of double dealing towards his father and his countrymen in Holland.

The transactions which took place at Antwerp in October had the further effect of rendering the Belgians still more adverse to the Orange dynasty than they had before been. That city was invested by a Belgian force, whilst within, notwithstanding the resistance of the armed burghers, the populace became masters of the place; and the citadel was occupied by a garrison of 8000 good troops, commanded by the bravest of the Dutch officers, General Chassé. A truce had been concluded between the adverse parties, and a white flag hoisted from the fort; but the Belgian officers were unable to maintain it, the populace having begun an attack on the citadel, though with no other arms than muskets. This was not returned, but a cannon was brought forward by the populace, and a fire opened on the gates of the citadel, which, as the Belgian officers assert, was without their approbation or knowledge. On this infraction of the truce, Chassé ordered two or three guns to be fired from the bastion facing the arsenal. This being found ineffectual, the white flag was taken down; a signal was made to the fleet, consisting of eight vessels of war, in the Scheldt, close to the town; and a cannonade and bombardment commenced. It was more terrific than injurious, the fire being chiefly directed against the arsenal and the entrepôt, where all the military and naval stores in the former were destroyed; whilst in the latter large quantities of sugar, coffee, hides, cloths, silks, and spices, were burned and buried in the ruins of the storehouses. The firing had continued some hours when a deputation from the city made their way to the citadel, and proposed a suspension of hostilities, which was instantly agreed to, and the firing ceased. Never, perhaps, was exaggeration or misrepresentation carried farther than on this occasion, in the reports printed and circulated through Belgium; and the effect which they produced destroyed the last hope of those who wished well to the Orange dynasty. Since that event, official accounts made out by the Belgian custom-house show, that the whole loss of goods in the stores amounted to 1,888,000 florins, or L.157,200; whilst the damage done to private buildings, and the furniture in them, amounted to 679,466 florins, or L.59,450. In this the loss of the public buildings was not included. The number of the killed was only sixty-eight, of whom seventeen were military men, and the others those of the populace who had caused the calamity. The Dutch asserted that the fire was confined almost wholly to the spot

where the munitions of war were stored, and that the rest of the city was designedly spared.

As all hope of conciliation was thus destroyed, the court of the Hague made pressing solicitations to the four powers who by treaty had formed the kingdom of the Netherlands, to fulfil the obligations imposed upon them by the treaty of Vienna of 1815. But it was soon seen by the answer of Lord Aberdeen, the British secretary of state, and by those of the ministers of the other powers in succession, that none of them was disposed to make use of any other than pacific measures. This proceeding gave rise to negotiations between the allied powers, which were chiefly carried on in London, out of which proceeded numerous protocols, which had no decisive influence on the course of events. The public affairs of Europe favoured the independence of Belgium. All the powers were in alarm at the recent events in France, and all feared, not that the scarcely seated king would willingly commence a war of aggression, but that the democratic party might become sufficiently powerful to compel him to associate himself with the Belgians, and to bring that country under the power of France. The obvious interest of the four great powers was tranquillity, and the securing of the Continent against Flanders becoming the base of military operations towards the centre of Europe. If these could be obtained, it mattered little whether they arose from the junction or the separation of the two portions which had formed the kingdom of the Netherlands. The first meeting of the ministers of the great powers showed that they merely considered themselves as arbitrators between the northern and southern divisions of the newly-dissolved kingdom; and their first measures were addressed to the object of a suspension of hostilities, which was to a limited extent acquiesced in by both parties.

To settle the internal government now became the first object of the Belgians, who considered their independence as firmly assured. A national congress was accordingly assembled at Brussels, consisting of two hundred deputies, chosen in the several provinces, from all tax-paying persons above twenty-five years of age, without exception as to religion. The qualification for the electors and the elected was the paying of taxes, which varied in the several provinces according to their estimated wealth. Thus, in Luxembourg, the poorest province, the qualification was the payment of taxes annually to the amount of twenty-one shillings and sixpence; but from this the required rate was gradually raised, till, in Flanders, the richest of the provinces, the tax paid required to be six pounds five shillings. The assembly was a fair representation of the people of Belgium; for scarcely any proprietor was excluded from voting, whilst in the larger towns and cities the mere populace, from the qualification being higher, had not the means of introducing their favourites. As soon as the assembly met, the demagogues, who had contributed to the revolution, became insignificant. De Potter, Thielman, and the others who had been martyrs and heroes with the mob, sunk into insignificance.

The assembly proceeded to business in a regular manner. Three important propositions were presented to the congress. The first was the declaration of independence, which was voted unanimously; the second, proposed on the 22d of November, decided against a republic, and in favour of a constitutional hereditary monarchy, by a majority of 174 against thirteen votes, but it did not fix on the title of the future chief of the state; the third proposition, brought forward on the 23d, was for the perpetual exclusion of the Orange Nassau family. This was debated during two days, and at the close was agreed to by a majority of 161 against twenty-eight. The object of the minority was to delay the proposition till a more cool and distant period, and till it could be known whether the revolution which had taken place would lead to a war against Belgium. Mr Van de Weyer had, however, returned from a mission to London,

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and it was commonly believed he had ascertained that the sentiments of Lord Grey and the new ministers were as averse to any warlike interference as those which had been previously expressed by the Duke of Wellington and Lord Aberdeen.

It seems probable, that at the period in question the governments of England and France were co-operating in endeavours to place the Prince of Orange on the throne of Belgium; even if it could be accomplished in defiance of the positive declaration of the king his father, who did not scruple to assert, "that he would rather see De Potter placed on the throne than the Prince of Orange." But if such was the desire of the two kingdoms, it was soon discovered to be utterly impracticable, though much time was spent under the impression of its feasibility, and much suspicion excited amongst the Belgians against the sincerity of France.

Whilst the plenipotentiaries were settling the most equitable plan for separating the two countries, and had given their view with respect to the boundaries of each, they also adjusted what portion of the debt of the Netherlands should be assigned to Belgium, and what to Holland, fixing the former at $\frac{1}{3}$ parts, and the latter at $\frac{2}{3}$ parts. These discussions led to others; and it soon became known, that however independent Belgium might become as regarded Holland, it was too dependent on the superior power of the European kingdoms to be permitted the spontaneous nomination of the individual who was to become its sovereign. At that time a large, perhaps a predominant, party in the assembly would have preferred one of the Bonaparte family; but this, it soon appeared, would not be permitted by France. Another party were inclined to select a son of Louis Philip, the king of the French; but intimations had been communicated to that prince, that England would consider an acquiescence in the project as a sufficient cause of war; and he agreed to the exclusion of his son, but so privately that it was only known to a few individuals beyond the diplomatic circles. The partisans of the house of Orange took no open and avowed part in these discussions.

The inefficiency of this representative assembly to the real purposes of a government was speedily shown in the long and bombastical speeches of the members; in the absolute confusion in every department, whether civil, military, or judicial; and in the mobbing and plundering which prevailed in all the provinces. The necessity for an executive power was so strongly felt by the more reflecting members of the assembly, that after several days' preparatory debate, it was resolved, on the 19th of January 1831, to proceed to the election of a chief on the 28th of that month. The election of a sovereign, or rather of a dynasty, was enough to kindle agitation and intrigue; but perhaps less of these than might have been expected was discoverable, from the great number of the candidates whose pretensions were urged. On the day before the election, petitions were presented to the assembly in favour of Lafayette, Fabvier, Chateaubriand, the Prince of Carignan, the Archduke Charles; Surlet de Chokier, Charles Rogier, and Felix de Merode, private Belgians; Prince Otho of Bavaria, John duke of Saxony, a Prince of Salm, the Pope, the Duke of Nemours, second son of Louis Philip, and the Duke of Leuchtenburg. Besides these, the Duke of Lucca, the Duke of Reichstadt, the son of Napoleon, and the Prince of Capua, brother of the king of the Two Sicilies, were suggested. The choice of the last was seriously contemplated by the French, through Talleyrand; but the Belgians showed no predilection for him, although he was not objectionable to any of the four powers. Had the Belgians showed any decided eagerness for Prince Otho of Bavaria, it was known that he would have been recognised by England, France, and Prussia; and that he

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would then have obtained the hand of the Princess Mary, third daughter of the king of the French. But his age, for he was only fifteen, formed an objection with the Belgians. The popular press, decidedly democratic, was most united in favour of the Duke of Leuchtenburg; but its power had been used till it was exhausted; and, besides, the choice was in better hands than those who are influenced by its inflammatory declamations. It is remarkable, that amongst the long list of candidates the name of Prince Leopold was never once mentioned. It has been suggested that England had not even then abandoned the hope of fixing the Prince of Orange on the throne. This would have been approved of by Russia, Prussia, and Austria, and by the nobles and wealthier part of the Belgians, but not by France, as Louis Philip was disposed to fear that the example of enthroning the son of the deposed monarch might hereafter have been taken as a precedent in favour of the Duke of Bordeaux against his son in France.

At the eve of the election, however, by some strange caprice of circumstances, all the names were withdrawn excepting the two, who, all intelligent persons knew, could not be allowed to rule. It was remarked of them by Northomb, one of the most respectable of the democratic members, that "the Duke of Leuchtenburg was essentially anti-French, without being European, whilst the Duke of Nemours was so exclusively French as to be directly anti-European." It is singular that both these personages had been declared inadmissible by the conference of the representatives of the great powers. The name of the Archduke Charles of Austria was then brought forward; but he could only be considered as a cloak for the partisans of the Prince of Orange, and for other members, who knew he would not accept the dignity, for the purpose of reducing that absolute majority of the whole voters which was necessary to the choice. The votes were taken by ballot, and the following result appeared when the names were drawn from the urn:—The total number of voters was 191, and consequently the required absolute majority was ninety-six. Nine members being absent, there appeared for the Duke of Nemours eighty-nine, for the Duke of Leuchtenburg sixty-seven, and for the Archduke Charles thirty-five, so that, in fact, there was no election. A new voting then became necessary, and the second scrutiny gave a definite result. Another member had entered, making 192, and consequently the absolute majority required was ninety-seven. The state of the voting then appeared to be, for Nemours ninety-seven, for Leuchtenburg seventy-four, and for the archduke twenty-one. This annunciation was received with acclamation by the populace, and with expressions of joy by the partisans of the successful candidate, who well knew his father would not permit him to accept the offered crown. A deputation was despatched to Paris to announce the choice. But the throne was refused, and the deputies returned after paying and receiving some unmeaning compliments.

The moment was seized by the partisans of the Prince of Orange in order to raise a commotion in his favour. It was a wild project, confined to Ghent, Bruges, and Antwerp, where his adherents were numerous, especially amongst the lower class, who had been thrown out of employment by the cessation of commerce and manufactures. The attack on Ghent was speedily quelled, and the leader fled; but he was seized on his way to France, and on his person were found letters from the Prince of Orange, then in London, encouraging the project. This unsuccessful effort, and the evidence of the prince's participation in it, proved very injurious to his cause; and even sober men who had favoured him, were disgusted with what appeared to them to be an attempt to involve the country in a civil war.

On the refusal of France, the assembly, still feeling the

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want of an executive power, passed an act that the throne was vacant, thereby establishing the monarchical principle, and then proceeded to the election of a regent as a temporary measure. The choice fell upon Baron Surlet de Chokier, a worthy, well-meaning man, of no great abilities, who showed little solicitude for the dignity; and on the 25th of February he was installed with some parade. Plots and conspiracies were forming around him in every direction, and the demon of civil war was urging on the people to mutual destruction. The feeble government of the regent could produce neither obedience nor tranquillity within the country; and it was threatened by the Dutch, who adhered to their king and his purposes with equal union and ardour. It was reported, during the regency, that schemes for the dismemberment of Belgium were contemplated by some of the continental powers. According to this project, two thirds of Flanders, the province of Antwerp, and the northern half of Limburg and Brabant, including Brussels, would have fallen to Holland; the eastern part of Luxembourg, with Liège and other territories upon the left bank of the Meuse and the Moselle, would have been transferred to Prussia; and Namur, Hainault, and the west part of Flanders, would have been ceded to France. If this project was seriously entertained, it received such discouragement from the British government, that it was speedily abandoned. About the same period, that is, about a month after the instalment of the regent, extensive plans were formed for a general rising amongst the Orange party, in connection with some of the chief officers of the army and the most influential leaders of the burgher guards of Brussels. But this came to nothing, having, it is said, been discountenanced by the British minister at Brussels, who saw no other effect that could arise from it but a general European war. It is said that after some discussion respecting Luxembourg, and checking the petty hostilities on the frontier, the British government in April gave up all hope of establishing the Prince of Orange on the Belgic throne. On the 12th of that month a kind of proposition was made by some of the influential members of the assembly, and privately communicated to Sir Edward Cust, one of the equerries of Prince Leopold, with the design of ascertaining whether the prince, if chosen, would accept the crown. Leopold answered in the affirmative, but strictly abstained from giving any authority to make exertions in his favour. He was however convinced, before the election, that a vast majority of the electors would vote in his favour; and that he should have all the aid of the clergy and the high Catholic nobility, with no opposition but from the French and movement party, and the few Orangeists that had seats in the assembly. A deputation of four members repaired to Claremont, and had an interview with the prince. They explained their object, and the conditions upon which they were authorized to offer the crown, and awaited his reply. It manifested a noble, simple, and frank disposition, and concluded thus: "All my ambition is to contribute to the happiness of my fellow-creatures. When yet young, I found myself in so many difficult and singular situations, that I have learned to consider power only with a philosophic eye. I never coveted it but for the sake of doing good, durable good. Had not certain political differences arisen, which appeared to me essentially opposed to the independence of Greece, I should now be in that country; and yet I never attempted to conceal from myself the difficulties of my position. I am aware how desirable it is that Belgium should have a sovereign as soon as possible. The peace of Europe is deeply interested in it."

The deputation returned, and many stormy discussions ensued. Attempts were made to defer the election till all differences with Holland were settled; but these were overcome by the votes of 137 to 48. The election took place on the 4th of June, when 152 votes out of 196, four only

being absent, determined that Prince Leopold should be proclaimed king of the Belgians, under the express condition, that he "would accept the constitution, and swear to maintain the national independence and territorial integrity."

This choice, though not expressly unanimous, was such in reality; for of the minority of forty-three, nineteen voted on the ground that the election was premature, fourteen voted for Baron Surlet de Chokier, solely on account of private friendship, and thus the real opposition to Leopold consisted only of ten. Though the voting was by ballot, yet the vote of every man was known; and all who dared, gave reasons for it, except the ten, who were well known as terrorists.

Leopold lost no time in repairing to the post to which he was appointed, and, with only one aide-de-camp and a few domestics, landed at Ostend on the 17th of June, and proceeded directly through Ghent to the palace of Lacken, near Brussels. He made his public entry into that city on the 21st, and was received with cordiality by the higher classes, and by the populace with loud acclamations. The king took the oath to the constitution; the regent delivered up his power; and the congress was dissolved, to make way for the election of the members who were to form the two legislative chambers, as prescribed by the fundamental laws.

The first chamber, or the senate, was to consist of fifty members, chosen for eight years, but one half of them was to be renewed at the end of four years. The qualifications were to be, having attained the age of forty years, and paying direct taxes to the amount of 1000 florins, or L.84 yearly. The second chamber was to consist of 101 members, being at the rate of one for 40,000 inhabitants. They were to be of the age of twenty-five years, to pay annual direct taxes to the amount of L.8, and to be paid at the rate of 200 florins, or L.16, each month during the session. They were to be renewed by one half retiring at the end of two years, but they might be again elected.

After a few formalities, and appointing the ministers to compose the cabinet, on the choice of which much judgment was exercised, the king left the capital to visit Antwerp, Liège, and the other parts of the new kingdom, and was everywhere received with demonstrations of respect and of loyalty. But whilst the proceedings just narrated were passing in Belgium, a storm was gathering on the side of Holland, which had not been anticipated, and to meet which no adequate preparations had been made. The Belgians relied on the armistice which the conference of the ambassadors had established, and the few measures which were taken by them discovered only the confusion and disorder inseparable from all popular movements. In Holland, every thing betokened tranquillity, order, and loyalty. The different orders of the government and the people were more eager for punishing what they denominated the rebellion, than even the king and his family. A powerful army was quickly assembled. It was well disciplined, officered, and appointed, and furnished with an ample train of artillery; and yet all was done with so much secrecy, that till that army was ready to advance beyond the frontiers, no preparation was made to resist it.

Much dispute has arisen relative to the right of Holland to commence hostilities without due notice of the cessation of the armistice; but, on the other hand, Holland maintained that due notice had been given. The whole turned on the precise sense of the words "ses moyens militaires," in a note delivered by the Dutch ministers to the conference of ambassadors. The king was certainly encouraged in the enterprise by the stormy scenes exhibited in the Belgian assembly between the period of Leopold's election and the time of his arrival. By the noxious influence of the press, such angry passions had been kindled in every

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division of society, as seemed to threaten internal war; but happily a most powerful speech of Mr Lebau in favour of union, and urging the importance of rallying round their new monarch, had the effect of producing feelings of tranquillity; though no language had power to produce order or infuse energy, when the time approached for the exhibition of the one and the exercise of the other.

The Prince of Orange having assumed the command of the Dutch army at Breda, on the 1st of August, the order to advance was instantly given; and the march of the several divisions commenced the next day. This was a complete surprise to the Belgians, who were unprepared at every point to resist a disposable army of more than 40,000 men. It is not necessary here to describe the position and the movements of the various corps on both sides. It was, however, remarked by military men, that the Prince of Orange advanced more deliberately than the occasion required. Leopold collected his forces, such as they were, near Louvain, in order to cover his capital. In this position the Dutch army, having seized the road which led to Brussels on the 9th of August, advanced to attack him. The Belgian troops could not stand for a moment against their opponents, but instantly fled, throwing away their arms, and escaping in disorder; and a neglect of the Dutch, who thoughtlessly left open a road behind Louvain, alone prevented Leopold and his whole staff from becoming prisoners of war. He, however, made good his retreat to the capital, upon which all hostilities ceased. As soon as the movements of the Dutch were known, Leopold appealed to France for assistance. A French army was cantoned on the frontiers, which, by telegraphic communications, was instantly set in motion; and intelligence of their advance was formally announced to the Prince of Orange by Lord William Russell, coupled with an intimation, from the French marshal Gérard, of the determination of the two powers to enforce the abandonment of all military operations. As the French army rapidly entered the country, the Prince of Orange soon saw the necessity of retreating; and a convention was concluded between him and the French general, in consequence of which he returned to Holland, and the French repassed the frontier; so that by the 1st of September both armies had left the Belgian territory.

The cowardly disgraceful conduct of the Belgic troops was of great benefit to the new government. It showed the reflecting part of the community the folly of trusting the defence of their country to a host of popular partisans, too ready to destroy or to plunder, but too much inflated by the flattery they bestowed on themselves to become efficient defenders when steadily opposed. All saw the necessity of confiding in their chief, and became convinced that a regular army must be formed, in which the men should be compelled to obey their officers. The formation of an army was therefore determined on; but Belgium could not furnish officers. Most of those appointed had been placed in stations of which they were unworthy, because they had been what was called distinguished patriots, that is, leaders of the revolutionary movements; but those active disorganizers were found worse than useless when energy against an enemy required order, discipline, and obedience. By the interference to protect Belgium against Holland, this farther advantage was gained, that the protecting powers were placed in a position to obtain more weight in the negotiations carried on in the conferences of the ambassadors, and both parties were more disposed to leave the contested points respecting boundaries to their arbitration.

In forming an army, Leopold was assisted by the French, who, as far as could be done, furnished it with able officers; a want which Belgium could by no means supply from the natives of that country. The partisans of the Orange fa-

mily, on this occasion, justified the conduct of King William previous to the revolution, in having selected few of his officers from the Belgians. The selection of Frenchmen, they contended, proved that William was right in not trusting to officers taken from that division of his kingdom.

After the Dutch irruption, Leopold proceeded with coolness and vigour to restore order and gain confidence. He kept on the best of terms with the most important party, the Catholic clergy and the Catholic nobility, and avoided any nearer contact with the French party than politeness and civility required. He knew who were the real friends of monarchical government, and his best supporters. His marriage with a daughter of the king of the French, who was a Catholic, and the contract that the children of the marriage should be educated in the Catholic faith, were powerful means of attaching to his throne all those of his subjects who were under the influence of the clergy. The Belgian army, under the French officers, soon attained considerable advancement in organization and discipline. The undisciplined free troops were disbanded, and the best of the men incorporated in the regiment of chasseurs. Some superior officers were superseded, and many of the subalterns dismissed. A military school was established, and a corps of sappers and miners with a pontoon brigade raised.

The civil list was arranged with economy and order, and the other branches of the public service reformed, and others newly arranged. The talents and the integrity of Leopold, and his benevolent disposition, made a very favourable impression on all that approached him.

Whilst affairs were thus proceeding within, the great work of general pacification was attended to by the members of the conference in London. A final decision was come to on the 15th of November, expressed in twenty-four articles. These settled the great point of boundaries, and placed the question of Luxembourg in a way the most favourable, as was thought, for future pacific arrangement; but, above all, it expressed a determination "to oppose, by every means in their power, the renewal of hostilities between the two countries." This arrangement was ratified by the Belgian and French sovereigns on the 20th and 24th of November, by the British on the 6th of December, by Austria and Prussia on the 18th of April 1832, and by Russia on the 4th of May.

By these articles, the division of the joint debt was fixed on the scale before arranged, viz. $\frac{1}{3}\frac{1}{4}$ for Belgium, and $\frac{1}{3}\frac{1}{2}$ for Holland; but as the latter had discharged the whole interest as it became due from the first disturbances, she was to be paid the share of the advances, with interest on them at the rate of five per cent. Another point arose out of the settlement of the limits of the two countries. Holland was to have Maestricht, and was in actual possession of that place and its citadel; but Antwerp, which was allotted to Belgium, and was in possession of the Belgians, was commanded by the citadel, which was garrisoned by a Dutch army under the command of General Chassé, a distinguished officer, who, after the annexation of Holland to France, had served in the army of the Emperor Napoleon. The Belgians had given only a conditional ratification of the articles of the 15th of November, upon the express stipulation that the whole of them, in which the possession of the citadel of Antwerp was certainly included, should be fulfilled. They were precluded by that instrument from exercising hostilities, and therefore claimed from the parties to it the performance of its conditions.

It was important to the allied powers that the throne which they had established in the person of Leopold should be strengthened in the views of his subjects, who had sometimes manifested dispositions to democracy, and at others strong inclinations for a union with France, neither of which were deemed compatible with the interests of the European commonwealth. But it could not retain respect if the con-

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ditions framed by the founders were to be impugned by the Dutch holding the citadel of Antwerp, whilst they were still in possession of Maestricht. These considerations had their due effect on the conference, who, on the 1st of October, unanimously resolved that forcible means were necessary. They differed in regard to the means, the northern courts wishing to adopt pecuniary coercion, by deducting from the debt due from Belgium to Holland a sum weekly till the fortress was delivered up; but to this France and England objected, as leading only to future and tedious negotiations, during which Rotterdam and Amsterdam might enjoy those exclusive commercial advantages which Antwerp was entitled to share with them.

Belgium, being wearied with these entangled negotiations, and having now created an army of more than 100,000, gave notice that, unless their territory was evacuated before the 3d of November, they would use force to compel it. But this would have created a war, which all the powers were anxious to prevent. On the 22d of October, a convention was therefore entered into between England and France, which was forthwith communicated to the three other powers, of whose passive adhesion they were assured.

By this convention it was determined, that if the places assigned by the former resolutions to the respective parties were not given up before the 12th of November, France and England would enforce the delivery of these places. This determination was communicated to both nations. Belgium was ready to give up Venloo, which she held; but Holland positively declined surrendering the citadel of Antwerp. The result was, that a combined fleet of English and French proceeded to blockade the ports of Holland, and detain the merchant-ships, whilst France prepared an army to besiege the citadel, without allowing the Belgians in any way to interfere in the military operation. The siege of Antwerp by the French, as a fine practical exemplification of science, became an object of great interest to the military amateurs of all Europe, who repaired thither as spectators. But this is not the place for recording the history of that warlike spectacle. It was vigorously and skilfully attacked; and the defence, which was altogether passive, exhibited a conspicuous example of fortitude and endurance. The first works of the besiegers were opened on the 30th of November, and on the 24th of December the citadel capitulated, when the garrison marched out, and the French took possession of the battered fortress, which, on the 1st of January, they delivered up to the Belgians. The city of Antwerp was not in the least injured, as the approaches were carried on upon the opposite side. The French army shortly afterwards withdrew from Belgium to its own territory. The Dutch garrison was marched into France as prisoners, on the ground that two forts on the river Scheldt, those of Lillo and Liefenschoeck, were still retained by the Dutch. This led to long and complicated diplomatic negotiations, which were at length adjusted, when the captured garrison returned to their own country. Since that period no hostilities have taken place; but, on the other hand, no treaty has been entered into, and consequently no intercourse between the two countries has been permitted.

Belgium has at length been acknowledged as an independent power by most of the states of Europe, but only provisionally by some of them. Many of the owners of ships, especially of those of the first class, have withdrawn their concerns from Antwerp and Ostend, and formed establishments in Rotterdam and the other parts of Holland. Of these removals, not a few have been caused by the colonies appertaining exclusively to Holland. But this withdrawal has had less influence on the marine commerce of the Netherlands than might have been expected; for British and American ships have brought to Antwerp colonial produce, on quite as favourable terms as they were before

supplied, and in sufficient quantity to enable the Belgians to maintain their commerce with the interior of Germany.

Attempts are now in progress to bring Antwerp in communication with the Rhine. But, on the part of the Prussian government, these have encountered some obstacles, not from any disinclination to the work, but from doubts as to the particular line to be followed, and some financial circumstances respecting the tolls. If the projects in question be accomplished, the Belgians will be much benefited, and have the power of supplying produce to the south of Germany, and also to Switzerland.

The manufacturers have suffered much from the separation, especially those of Ghent. But a trade has grown up to a wonderful extent, of smuggling English goods of the finer kind into France, which the numerous douaniers have not been able to prevent along such an extended line of frontier.

Agriculture, which, after all, is the chief source of Belgian wealth, does not appear to have retrograded in consequence of the struggle of the separation. On the contrary, it appeared to the writer of this article, in two journeys which he made through the country, that much improvement was visible in the appearance of the farms, and in their appurtenances.

This kingdom, in the condition in which it now exists, is bounded on the north by the kingdom of Holland; on the east by the Prussian, Westphalian, and Rhenish territories; on the south by France; and on the west by the German Ocean.

The civil divisions of the kingdom are as follow.

Provinces.	Extent in Square Miles.	Population.	Capitals of the Provinces.
South Brabant.	1,298	556,146	Brussels.
East Flanders...	1,188	733,938	Ghent.
West Flanders.	1,276	601,704	Bruges.
Antwerp.....	1,128	354,974	Antwerp.
Hainault.....	1,474	604,957	Mons.
Namur.....	1,422	212,725	Namur.
Liège.....	1,421	369,937	Liège.
Limburg.....	1,128	337,703	Limburg.
Luxembourg...	1,194	292,151	Luxembourg.
	11,529	4,064,235	

As the above statement is taken from the official returns of the Belgian government, the disputed portions of Limburg and Luxembourg are included in that kingdom, although still subjects of discussion. The number of the inhabitants is given according to the census of the year 1830, since which the number must have increased. The tables of the population annually furnished by Smits to Quetelet show an excess of births over deaths of 20,000 persons in each year, and consequently the whole population may now (1837) be taken at 4,200,000. Of the population at the census of 1830, the numbers in the cities were about one fourth of the whole: they amounted to 998,118, whilst the rural inhabitants were 3,066,117.

The cities which contain more than 10,000 inhabitants are,

Brussels.....	103,200	Courtray.....	19,036
Ghent...	83,783	St Nicholas.....	16,386
Antwerp.....	77,199	Lokeren.....	16,069
Bruges.....	42,198	Ypres.....	15,940
Tournay.....	28,737	Alost.....	14,791
Louvain.....	25,643	Lierre.....	13,153
Mechlin.....	24,436	Turnhout.....	12,493
Mons.....	23,010	Thielt.....	11,519
Namur.....	21,571	Ostend.....	11,328
Verviers.....	19,592		

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The following division of the land is drawn up by Mr Quetelet, with his usual accurate examination of facts.

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Provinces.	Cultivated.	Uncultivated.	Land Built on.	Roads, Canals, and Rivers.	Total.
Limburg.....	310,514	139,410	1,480	15,283	466,687
Liège.....	237,579	40,850	915	9,648	288,992
Namur.....	278,397	58,959	926	9,401	347,683
Luxembourg.....	463,423	167,760	1,462	17,571	650,216
Hainault.....	356,258	3,455	2,962	9,794	372,469
Brabant.....	316,883	1,356	1,768	8,419	328,426
East Flanders.....	264,988	1,310	4,422	11,641	282,361
West Flanders.....	296,915	8,690	2,015	8,965	316,585
Antwerp.....	197,303	72,651	1,719	12,157	283,830
	2,722,260	494,441	17,669	102,879	3,337,249

This account is framed in the hectolitre of France, each hectolitre being somewhat more than two English acres and a quarter.

From the proportion which the rural inhabitants bear to those in the cities, it may be concluded that agriculture is the chief pursuit of the kingdom. It becomes, therefore, a branch of industry of the most interesting kind.

The land of Flanders is not naturally fertile; on the contrary, its quality is merely such as to admit of fertilization by a series of operations more or less expensive and laborious. Where cultivation has not been extended, the soil produces nothing but heath and fir. As the property of such lands may be acquired for a very small sum, many individuals have attempted to bring portions of it into cultivation, but have almost uniformly found the expense of doing so to exceed the value of the produce which can be drawn from it. Abbé Mann, to whom we are indebted for some valuable communications on the subject of Flemish agriculture, observes, "What land is cultivated in the Campine of Brabant, is owing to the religious houses founded in it, especially to the two great abbeys of Tongerlo and Everbode. Their uninterrupted duration for five or six hundred years, and their indefatigable industry, have conquered the barren harsh sands, and rendered many parts of them highly productive. The method they follow is simple and uniform; they never undertake to cultivate more of this barren soil than they have sufficient manure for; seldom more than five or six bunders (fifteen or eighteen acres) in a year; and when it is brought, by labour and manuring, into a state capable of producing sufficient for a family to live on, it is let out to farmers on easy terms, after having built them comfortable habitations. From the undoubted testimony of the historians of the Low Countries, it appears that the cultivation of the greater part of these rich provinces took its rises from the self-same means, 800 or 1000 years ago, when they were in a manner one continued forest." Although, from the destruction, dispersion, or diminution of the religious communities by the French Revolution, the process of reclaiming other parts of the heaths has been suspended or rendered languid, yet the excellent agricultural practices, which a long series of years had ingrafted into the minds and habits of the sluggish peasantry, have been adhered to with a tenacity which is obviously distinguishable in all the other customs, as well as in the manners, dress, food, and religion of the people. Besides that general system of economy which is indispensable to the success of all efforts, and which there enters into the minutest details of husbandry, the two great objects which seem to be aimed at in all their operations are the increase of those crops which afford sustenance for cattle, and the careful preservation of every substance which can be converted into manure, and returned again to the land, in order to renew its exhausted fertility.

The foundation upon which the agriculture of Belgium rests is the cultivation of clover, which seems indigenous, since none of the most ancient records notice its introduction, but speak of it as familiarly as of hay or oats. It is probably from this country that the plant in question has been, though but recently, slowly, and hitherto only partially, introduced amongst the farmers of Germany, France, and Great Britain. The clover in Flanders is sown in every sort of grain, in wheat, rye, and winter barley, in the spring of the year, when the blades of those plants have acquired a growth of three or four inches; and with oats and summer barley at the same time with those seeds. It is also often sown with flax; and, in general, the crops grown between those plants are more luxuriant than when sown with the cerealia. It frequently happens, when sown with flax, that clover yields a heavy crop a few months after it is sown, two still more abundant crops the next year, and sometimes even three; and if, as it occasionally happens, it be suffered to stand another year, it will yield one heavy crop, and afterwards good pasture for cattle, till it is ploughed up to receive the seed of wheat, which usually follows it. The original strength of the plants which yield such abundant nourishment is undoubtedly due to the care taken in pulverizing the soil by frequent ploughings and harrowings, to the careful extirpation of all weeds, and to the copious stores of manure laid on the ground, and its complete amalgamation with the soil; but the successive harvests which the plants yield are attributed, and with apparent probability, to the top-dressings which are bestowed upon them. The top-dressings administered to the young clover consist either of rotten yard-dung, lime, pigeons' dung, coal, or native turf-ashes, and are laid on as soon as the plants begin to extend themselves over the ground. Sometimes the plants are refreshed with a liquid manure, which will hereafter be noticed. These manures, though administered to the clovers, as far as they can be obtained, are found far inferior in powers of fertility to that substance which is most generally used, and the effects of which form the theme of the praises bestowed by all who have witnessed the Belgian husbandry. The turf-ashes of Holland are sown by the hand on the clovers, in quantities varying from eighteen to twenty bushels to the English acre. This small quantity produces a most surprising, and almost magical effect. Within a few weeks after it is sown, a field where none or but slight straggling plants were to be seen becomes covered with a most abundant herbage. The parts of a field sown with these ashes, at the first mowing, show their efficacy in a most striking manner; the clover being frequently a foot higher on such parts than on those where its sowing has been omitted. These ashes are found superior in efficacy to such as are made from the turf commonly used for fuel in Flanders, insomuch that one third of the quantity is deemed sufficient to afford as great productiveness. We have no analysis of the turf-ashes of

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Flanders, by which we can form a comparative estimate of the proportional substances which create so vast a difference between their vegetative faculties and those of the turf-ashes of Holland. The latter have been carefully analyzed by Mr Brande, secretary to the Royal Society of London, who found them to contain,

Siliceous earth.....	32 parts.
Sulphate of lime.....	12
Sulphate and muriate of soda.....	6
Carbonate of lime.....	40
Oxide of iron.....	3
	—
	93
Impurities and loss.....	7
	—
	100

These ashes are brought from Holland by the canals to Brussels, whence they are conveyed by land-carriage to the different farms where they are applied. Long practice has so convinced the Flemish farmers of their benefit, that a common proverb, in the patois of the country, may be thus translated: "He that buys ashes for his clover pays nothing, but he who does it not pays double." They are frequently fetched from the canal by persons who have to carry them forty or even fifty miles by land.

The abundance of the clover produced from the soil of Flanders enables the cultivator to maintain a great number of cattle, principally cows, the dung of which is managed with an attention and care that is highly worthy of imitation, and contributes to maintain in a state of high fertility that soil which yields the most exhausting crops. "The farmers," says the Abbé Mann, "supply the want of straw in the following manner: The peat or sods which are cut from the heath are placed in the stables and cow-stalls as litter for the cattle. The ground under them is dug to a certain depth, so as to admit a considerable quantity of these peat sods, and fresh ones are added as the feet of the cattle tread them down into less compass. These compose so many beds of manure, thoroughly impregnated with the urine and dung of the cattle. This mixture produces a compost of excellent quality for fertilizing ground where corn is to be sown."

But the most remarkable practice of the Flemish cultivators is the application of liquid manure. Under the farm buildings, large reservoirs are constructed, into which the draining of the dung, the urine of the cattle, and the contents of the privies, all run. This receptacle is divided by rails, so as to prevent any more solid substances from coming into that part where the pump is placed, by which it is raised from the reservoir into the carts employed to convey it to the fields. The liquid in these receptacles is commonly increased in efficacy by throwing into them, for solution, large quantities of rape-cake. This liquid manure, enriched by oil-cake in proportion to the purse or the spirit of the proprietor, is spread over the land, sometimes by the hand; and by habit the workmen have acquired the tact of distributing it equally and in previously prescribed proportions over a whole field. But it is more commonly conveyed to the fields in large casks on wheels, to the bungle-hole of which is appended a wooden shoot, narrow at the top, and broad at the lower extremity, which spreads the substance equally. For the flax and rape crops this manure is most liberally used. The quantity of this liquid applied to an acre of flax is commonly about 2500 gallons of English beer measure, in which about 1000 rape-cakes of three pounds each have been dissolved.

No country in Europe provides from its soil so great a quantity of sustenance for its inhabitants, so large a surplus of food for exportation, and such valuable commodities to exchange for articles of foreign growth, as Flanders. Besides wheat, rye, barley, oats, pease, beans, and

buck-wheat, madder, rape-seed, hops, tobacco, clover-seed, mustard-seed, flax, hemp, poppy-oil, and some other productions, are raised beneficially, both for home consumption and for exportation. As the inhabitants are in every thing averse to innovation or improvement, the implements of husbandry are in a rude state, and very little variation is made from the examples set by their ancestors some centuries ago. The various machines used in England for abridging animal labour in husbandry are unknown, and the use of human beings is still retained in many operations, for which horses and machinery are adopted by us with great advantage. The same aversion to innovate is seen in the management of the cows, the sheep, and the pigs; the races not having been improved by crossing, as in some other countries. The horses seem to have attracted more attention, and the race commonly seen is excellent for agricultural purposes, as well as for the road.

The separation of Belgium from Holland must have had some effect upon the agriculture of the former country, by excluding for the present the farmers from one of their best markets for corn; but the influence does not appear on the face of the country, where improvements still seem in progress.

In the most remote periods, the Netherlands were distinguished by their manufacturing skill and industry. Under the Romans, the inhabitants of Arras and several other Flemish cities were celebrated for the production of woollen cloths. At a later period, under the Emperor Charlemagne, a present of fine linen and of woollen cloth, sent to the caliph of Bagdad, Haroun al Raschid, was deemed to display the most curious specimens of the industry and skill of the western world. In the instructions of that monarch (*Capitular. de Villis Regum Francorum*), it appears that there existed at Liège, and other cities of the Netherlands, very extensive manufactories, both from flax and wool, in the dyeing of which madder and kermes berries were used, and were forbidden to be adulterated. The ancient condition of the manufactories of the Netherlands is peculiarly interesting, because it is to them that we and the rest of Europe are indebted for the first rudiments of those arts which have since been so widely extended in England, Scotland, France, Germany, and Holland. In the time of Charlemagne, it appears from the same collection, and from the *Historia Monasterii Salmuriensis*, that iron wares, gold and silver work, embroidery, arms, horse furniture, and various other articles, were extensively manufactured. The earliest Flemish fabrics were those of linen; and, as early as the year 960, free marts were established in several of the cities, to which great numbers of merchants from foreign countries periodically resorted. The present state of the linen manufactory is by no means flourishing; but large quantities of the finer kinds, made from flax of their native growth, are supplied by the inhabitants of this kingdom, and are everywhere highly esteemed. The finest yarn and the best bleacheries are at Haarlem; the best linen is woven at Herzogenbasch, Eindhoven, and some other places; but some fine linen, spun in Westphalia, is mixed with that of those places, and when bleached in Holland is not distinguishable from it. The curious manufactory of thread lace originated in this country, and still distinguishes it. The best is that of Brussels and Mechlin. In the former city and its vicinity it once gave employment to more than 14,000 persons; and at one period the exports of goods fabricated in Flanders, from the flax of their own growth, amounted to more than L.2,000,000 sterling. The woollen manufactories of Flanders were in a flourishing state as early as the year 980, but were most extensive from the twelfth to the sixteenth century. In the city of Louvain, in the year 1317, there were four thousand looms for weaving woollens. Brussels and Antwerp employed an equal

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number. Ghent was, however, the most distinguished city for its fabrics, both of wool and flax, and at that period employed 40,000 looms. When called upon to take arms, the weavers, under the banners of their trade, mustered 16,000 men. Ypres contained 4000 looms. Bruges was the storehouse and central point for the commerce of the half of Europe; but in 1478 the situation was changed for that of Antwerp, which continued to be one of the most flourishing cities of the world till the beginning of the sixteenth century, when the tyranny and fanaticism of Philip II. of Spain inflicted on the Flemish provinces the greatest sufferings.

A variety of circumstances have operated upon the manufacturing branches of industry in Belgium, and rendered them exceedingly fluctuating. The great extent of the cotton fabrics has diminished the consumption of linen goods, and been extensively felt in Belgium. In consequence of this, much capital was invested in machinery for making cotton goods, especially at Ghent; and the access to the settlements of Holland in the East and West Indies gave a degree of energy to the employment which the separation of the two countries has damped, if not quite destroyed. The home consumption, however, is very great, owing to the density of the population, and the general state of easy, if not affluent circumstances, in which the great economy of the people places them. In Ghent, Brussels, and some other spots, cotton goods are made. Verviers and the towns near it are celebrated for their excellent cloth; and in all the towns and villages, the making of linen and lace is a kind of domestic employment. There are refineries for sugar in Antwerp, Ostend, and Brussels. The produce of the mines of coal and iron in the provinces of Liège, Namur, Hainault, and Luxembourg, have laid the foundation of hardware manufactories to a great extent in the city of Liège, and on the banks of the Meuse. The chief evil which has been produced by the separation from Holland is experienced in the mining provinces. In consequence of this event, the whole of Holland now obtains its supply of the important article of coal from England, and of iron from our country, or from Russia and Sweden.

Belgium is well situated for foreign trade. The whole of its coasts are indeed rendered dangerous from sand-banks; but the channels between them and the shore are well buoyed and lighted, and there is a vast number of excellent pilots at all the various stations. The three ports are Ostend, Nieuport, and Antwerp. The first two are tide-harbours, but the latter is situated upon the Scheldt, and is accessible to the largest class of vessels in any state of the tide. It has also the advantage of capacious docks and storehouses, and is thereby admirably adapted to become a dépôt for an extensive commerce with the south of Germany, and with Switzerland. As the Dutch possess the shore on

both sides of the entrance of the Scheldt, this has proved a discouragement to the trade of Antwerp, though a temporary agreement has been made; and some impediments have been thrown in the way of the intercourse between Belgium and Germany by the financial confederation formed by Prussia. From these circumstances, some of the most considerable houses who were ship-owners have removed their establishments, including their vessels, from Antwerp, to Rotterdam and others of the ports of Holland. The Belgians have, however, been actively awake to the events of the period, and are making efforts to open new and favourable communications between Antwerp and the Rhine. A projected line of railroad has been completed as far as Brussels, a distance of thirty miles, and will be continued till it reaches the Rhine. These roads, in addition to the numerous canals and rivers which facilitate internal intercourse, are considered as likely to be productive of great commercial advantages.

The religious establishment of Belgium is strictly that of the Roman Catholic church; but its endowments are much curtailed by the long subjection to France. The whole of the inhabitants adhere to that communion, with the exception of 12,500 Protestants, mostly foreigners, and 1050 Jews. These are allowed to celebrate publicly their several modes of worship. There are two universities, one at Liège with about 500 students, and another at Ghent with about 400; and several seminaries for clerical education. The system of popular education is in a state of revision; but the schools will probably be placed under the exclusive superintendence of the clergy, as the classical schools have already been.

The circumstances in which the kingdom was till lately placed as regards the disputes respecting Luxembourg and Limburg rendered a large army necessary. At present the forces on foot consist of 59,000 troops of the line, and a reserve of 58,000; but reductions are in contemplation.

The sole executive government is vested in the king, and the ministers are responsible. The legislative power is lodged in two houses; the senate, consisting at present of forty-two members, and the chamber of representatives, consisting of eighty-five. Rather more than a third of each of the provinces of Limburg and Luxembourg, with their chief towns Maestricht and Luxembourg, has been confirmed to Holland by the treaty of 1839.

It is not easy to state the exact condition of the revenue, which, although on the increase, is not quite adequate to the expenses of each year. The national debt, when compared with the aggregate wealth of the country, is much lighter than in any other state in Europe; and, with the economy that has been adopted in every branch, a solid peace must in a short period produce general prosperity. (G.)

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Neudorf.

NETOPION, a name given by the ancients to a very fragrant and costly ointment, consisting of a great number of the finest spicy ingredients. Hippocrates, in his treatise on the Diseases of Women, frequently prescribes the netopion in diseases of the uterus; and in other places he speaks of its being poured into the ear as a remedy for deafness. The word *netopion* is also sometimes used to express the *unguentum Egyptiacum*, and sometimes simply oil of almonds.

NETRAVUTTY, a river of the south of India, in South Canara, which has its source in the western range of the Ghauts, whence it flows in a westerly direction, runs into the lake of Mangalore, and then discharges itself in the sea. It passes by the towns of Arcola and Buntwalla. It is navigable for small vessels as far as the tide flows, which is to Arcola, and afterwards by smaller boats twenty or thirty miles inland.

NETTINGS, in a ship, a sort of grates made of small ropes seized together with rope yarn or twine, and fixed upon the quarters and in the tops. They are sometimes stretched upon the ledges from the waist-trees to the roof-trees, from the top of the fore-castle to the poop, and sometimes are laid in the waist of a ship to serve instead of gratings.

NEU-BRANDENBURG, a city of the duchy of Mecklenburg-Strelitz, situated on a small river which empties itself into the lake of Tollen. It is surrounded with walls, and contains 652 houses, with 5145 inhabitants, who are chiefly employed in small manufactories.

NEUDORF, a city of the circle of Zips, in the province of the Hither Theiss in Hungary, situated on the river Hernath. It contains one Lutheran and two Catholic churches, 900 houses, and 5250 inhabitants, who are occupied in

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making linen goods, and in producing iron and copper wares. Long. 20. 29. 25. E. Lat. 48. 56. 30. N.

NEUFCHATEAU, an arrondissement of the grand duchy of Luxembourg, in Germany, comprehending ten cantons, inhabited by 91,750 persons. The capital is the town of the same name, situated in a raw and cold region of the Ardennes. It contains 230 houses, and 1340 inhabitants, who trade chiefly in cattle.

NEUFCHATEAU, an arrondissement in the department of the Vosges, in France. It extends over 416 square miles, is divided into five cantons and 132 communes, and contains 65,069 inhabitants. The chief town is of the same name, and is situated at the junction of the river Mouzon with the Meuse. In 1836 the number of inhabitants was 3645. Long. 2. 35. E. Lat. 48. 20. N.

NEUFCHATEL, an arrondissement of the department of the Lower Seine, in France, extending over 572 square miles, and peopled with 84,321 inhabitants. It is divided into eight cantons and 144 communes. The capital is the city of that name, situated in a fertile country watered by the river Bethune. In 1836 it contained 3463 inhabitants, who were employed chiefly in making woollen cloths of various descriptions for the Paris market. In the neighbourhood some good cider and perry are made. Long. 1. 30. E. Lat. 49. 45. N.

NEUFCHATEL, or, in German, *Neuenburg*, a canton in the western part of Switzerland. It extends in north latitude from 46. 51. to 47. 10., and in east longitude from 6. 22. to 7. 1., being 293 square miles. It contains three cities, three market-towns, 112 villages and hamlets, and in 1837 the inhabitants amounted to 58,616, all of whom are of the Burgundian race, and speak the French language. About 2500 profess the Catholic religion, and the remainder adhere to the reformed church. The land rises like an amphitheatre from the lake of Neufchatel, which is 1312 feet above the level of the sea, to the mountains of the Jura, which divide it from France, the highest points of which are about 3600 feet. The lake of the same name is a very fine object, being about twenty miles in length and four in breadth, and it has the extraordinary depth of 420 feet. The soil is of a medium fertility, generally resting upon a calcareous subsoil, on which the products ripen early. It scarcely produces corn sufficient for the consumption of the people, but it yields abundance of potatoes, pulse, culinary vegetables, and fruits, especially grapes. The wine is of a moderate quality. The quantity usually made is about 600,000 gallons, of which one half is exported. The chief manufacturing occupation consists in making watches and watch movements. About 130,000 are annually sent to other countries; and materials for the interior works, especially the chains, are exported to a large amount. The females are employed in making thread lace. A few good printed calicoes are also produced. The king of Prussia is the prince, and there is a council which regulates the internal affairs, of which the members are chosen for life. The revenue of the principality is 440,000 francs, the expenditure 420,000. It is bound to furnish to the Swiss confederacy a force of 960 men, and a contribution of 19,200 francs. The capital is the city of the same name, situated on the lake, at the point where the river Seyon falls into it. It contains two churches, a senate-house, three hospitals, and 540 houses, with 4715 inhabitants. The chief trade is in wine, and in the craft which navigate the lake, and are partly employed in fishing. Long. 6. 45. 19. E. Lat. 46. 59. 16. N.

NEUGRADISKA, a town of Hungary, in the Slavonian military frontier province, the capital of the circle of Gradiska, which extends over 668 square miles, and has a population of 59,124 persons, from whom the regiment of its name is supplied with recruits. The town is fortified, and contains a Catholic and a Greek church, with 209

houses and 1349 inhabitants. Long. 27. 19. 27. E. Lat. 45. 27. N.

NEUSATZ, a city of the circle of Bars Varmeyge, in the province of the Lower Danube, in Hungary. It stands on the banks of the Danube, is the seat of a Greek bishop, and has one Catholic and five Greek churches, 2367 houses, and 13,395 inhabitants, who are chiefly Servians and Armenians. It is a place of considerable trade, especially with the Turkish dominions. Long. 19. 46. 51. E. Lat. 45. 16. N.

NEUSOL, a city in the circle of Soler, in the province of the Lower Danube, in Hungary. It is situated on the river Gran, and is the place of assembly of the states of the comitat, and of the several boards of the government. It contains Catholic and Lutheran churches, a castle, 800 houses, and 10,069 inhabitants. There are also seminaries for the education of Catholics and Protestants; and the trade in iron and copper articles is considerable. Near to it good wine is produced, and there is an extensive royal manufactory of warlike arms. Long. 19. 4. 25. E. Lat. 48. 45. N.

NEUSS, a city, the capital of a circle of the same name, in the Prussian government of Dusseldorf. It stands upon the river Erft, which is navigable to the Rhine. It contains four churches, 850 houses, and 7200 inhabitants, who are occupied in manufactures of woollen, cotton, and other articles, and carry on considerable traffic by the Rhine with Holland and the interior of Germany. Long. 3. 30. 55. E. Lat. 51. 18. 2. N.

NEUSTADT, a city of the government of Opplen, in the Prussian province of Silesia, and the capital of a circle of the same name. It stands on the river Braune, sometimes called the Prudnick, and is surrounded with walls. It contains one Lutheran and two Catholic churches, a convent of the order of mercy, 446 houses, and 4520 inhabitants, who produce much linen and woollen cloth, and some cotton goods. Long. 27. 29. 25. E. Lat. 50. 15. 30. N.

NEUSTADT, a city of Bavaria, in the circle of the Upper Danube, and the capital of the bailiwick of the same name. It stands on the Danube, over which there are two bridges. There is an ancient castle, in the great hall of which many venerable curiosities are exhibited. It contains 600 houses, with 4384 inhabitants. It has but little trade, and depends chiefly on the seminaries for education, and the numerous pilgrims who resort to a celebrated image in the church of St Peter. Long. 11. 6. 4. E. Lat. 28. 44. 23. N.

NEUSTADTL, a circle of the Austrian Illyrian government of Laybach, extending over 1530 square miles, containing thirteen cities and towns, and 1835 villages and hamlets, with 29,236 houses, and 160,890 inhabitants, who are, for the most part, of the Wenden or Vandal race, and retain that language, which is a dialect of the Sclavonian. The capital is a city of the same name, situated on the river Gurk; it is fortified, and contains 280 houses, with 2050 inhabitants. Near to it are some warm baths, which are resorted to by invalids.

NEUTER, in *Grammar*, is a term applied to those nouns which are neither masculine nor feminine. The Latins have three genders; the masculine, the feminine, and the neuter. In the modern tongues, however, there is no such thing as a neuter noun.

Verbs NEUTER, by some grammarians called *intransitive verbs*, are those which govern nothing, and are neither active nor passive. When the predication expressed by the verb has no object, and the verb alone supplies the whole idea, then the verb is said to be *neuter*; as, I sleep, thou yawnest, he sneezes, we walk, ye run, they stand still. Some grammarians divide verbs neuter into those which do not signify any action, but a quality, as *albet*, it is white; or a situation, as *sedet*, he sits; or some relation to place, as *adest*, he is present; or some other state or attribute,

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as *regnat*, he rules; and those which do signify actions, but such only as do not pass into any subject different from the actor, as, to dine, to sup, to play, and the like. But this latter kind sometimes cease to be neuter, and become active, especially in Greek and Latin, when a subject is given them; as, *vivere vitam, ambulare viam, pugnare pugnam*. In like manner, the old French poets say, *Soupirer son tourment*; and the English, *to sigh his woes*. This only obtains, however, where something particular is to be expressed, that is not contained in the verb; as, *vivere vitam beatam*, to live a happy life; *pugnare bonam pugnam*, to fight a good fight. However, according to the Abbé de Dangeau, verbs neuter may be divided into active and passive; the former being those which form their tenses in English by the auxiliary verb *to have*, and in French by *avoir*; and the latter, those which form them in English with the verb *to be*, and in French by *être*. Thus, to sleep, to sneeze, *dormir* and *eternuer*, are neuters active; to come, and to arrive, *venir* and *arriver*, are neuters passive.

NEUTERCHENFELD, a town of Austria, in the province of the Lower Ens, where there is an establishment for military invalids. It contains 4950 inhabitants, who are employed in various kinds of trade and manufactures.

NEUTITSCH, a city of the circle Pererau, in the Austrian province of Moravia. It is a well-built town, with two large suburbs, consisting of villages separated from it by the river Titch; but, exclusive of them, the city contains 622 houses and 5410 inhabitants. It is celebrated for the manufacture of fine cloths.

NEUWIED, a city within the Prussian government of Coblenz, on the right bank of the Rhine. It is now the capital of the circle of that name, part of which was a principality, now mediatised, governed by the Prince of Neuwied, comprehending two towns and twenty-seven communes, with 10,960 inhabitants. The place is finely situated, and has a flourishing population, a great part of whom consists of a Moravian establishment, and of several Mennonite families. The Moravian house contains between 400 and 500 brethren and sisters, who have an institution for the education of boys, and another for girls, which are attended by considerable numbers from other countries. The whole city has 720 houses, and 4850 inhabitants, who are occupied in various manufactures, and carry on a considerable trade by the river. The prince, author of Travels in Brazil, has a fine palace and museum. Long. 7. 23. 15. E. Lat. 50. 25. 30. N.

NEVA, a river in Russia, flowing through St Petersburg, the capital of that empire. The views upon the banks exhibit the grandest and most lively scenes. The river is in most places broader than the Thames at London. It is deep, rapid, and transparent as crystal, and its banks are lined upon each side with a continued range of handsome buildings. See PETERSBURG.

NEVERS, an arrondissement of the department of the Nièvre, in France, extending over 839 square miles. It is divided into eight cantons and 99 communes, with, in 1836, 94,382 inhabitants. The capital, of the same name, is beautifully situated on the river Loire, where the Neve joins that stream. The cathedral is a fine ancient building. In 1836 it contained 16,967 inhabitants. There are many china manufactories, several iron furnaces, some glass-houses, and many makers of linen and woollen cloths, of cutlery and common jewellery, and it has a considerable trade by the navigable rivers. Long. 3. 4. 11. E. Lat. 46. 59. 17. N.

NEVIS, or NIEVIS, one of the West India islands, so called by its discoverer Columbus, after a high mountain of the same name in Spain. It is separated from St Kitt's by a strait about two miles broad, and full of shoals, in latitude 17. 14. north, and longitude 63. 3. west. Nevis

is a small but beautiful and fertile spot, consisting of one conical mountain about twenty-four miles in circumference, and containing an area of twenty square miles. That this island is of volcanic formation appears evident from a crater being visible on the summit; and the prevalence of sulphur in various parts affords additional proof of the fact. It is beautifully green, perfectly cultivated, and a complete forest of ever-green trees grows like a ruff or collar round the neck of the high land, where cultivation ceases. Its natural fertility is enhanced by an abundant supply of water; and sugar, the staple product, is raised in considerable quantities. Charlestown, the seat of government, lies along the shore of a wide curving bay, and the mountain begins to rise immediately behind it in a long and verdant acclivity. The court-house is a handsome building, with a square in front; it contains a hall on the ground floor for the assembly and the courts of law, and another room up stairs for the council. The island is divided into five parishes, and it has three tolerable roadsteads. In 1831, the population amounted to 500 whites, 2000 free coloured, and 8722 blacks. In 1836 it was estimated at 9250. The shipping which entered in 1835 amounted to 11,180 tons, and in 1836 to 847 tons. The government is quietly and respectably conducted by its council and assembly, but is in certain respects subordinate to that of St Christophers.

The following is a statement of the commerce of this island with the united kingdom. The exports into Great Britain were, in 1834, sugar unrefined, 59,748 cwts., in 1835, 39,637 cwts.; rum, 23,286 gallons in 1834, and in 1835, 39,366 ditto; molasses, 5466 cwts. in 1834, and in 1835, 161 cwts.; arrow-root, 17,768 lbs. in 1835; and during the same year, 1267 lbs. of succades, and 3511 lbs. of cotton.

This island was originally settled by an English colony from St Christophers, and, by the wise management of the first government, it soon became very flourishing. It was taken by the French in 1706, but restored at the peace of Utrecht. In the year 1782 it was again taken by the French, but restored at the peace in 1783.

NEVYN, or NEFIN, a borough-town of the county of Caernarvon and hundred of Dinlaen, in North Wales, 249 miles from London. At this place Edward I. triumphed after his conquest of Wales in 1284. It is a borough, and, conjointly with Caernarvon, Pwlllehi, Conway, Bangor, and Cricceth, returns one member to the House of Commons. The population amounted in 1831 to 1726.

NEW ABBEY, situated near Kilcullen Bridge, in the county of Kildare and province of Leinster, in Ireland. It was founded by Rowland Eustace, a man of ancient family in that county. The tower is still standing, and also some part of the abbey.

NEWARK, a town of the county of Nottingham, in the hundred of its own name, 121 miles from London. It is situated in a rich district, watered by the river Trent, over which there is a bridge, and an access to it by a fine road constructed on arches, so as to escape those inundations to which that part of the river is liable. Newark is a well-built town, with a fine market-place and a magnificent town-hall. The church is considered as one of the finest in the kingdom, and its spire is lofty and elegant. It was erected by King Henry V. A strong castle was built here by King Stephen, the walls of which are still to be traced. The town has withstood several sieges, the last of which occurred in the civil wars of the reign of Charles I., when it was taken after a long defence by the forces of the parliament. Newark was incorporated by Charles II. in gratitude for the defence it had made in his father's cause. It is divided into three wards, is governed by a mayor, six aldermen, and seventeen councillors, and sends two members to parliament. There is a well-supplied market, which is held on Saturday. The population amount-

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Newark.

Newark ed in 1801 to 6730, in 1811 to 7236, in 1821 to 8084, and in 1831 to 9557.

NEWARK, a post-town, and the capital of Essex county, New Jersey, one of the United States of North America. It is finely situated on the west side of Passaic River, six or seven miles by the course of the river above its mouth. It is handsomely built, and contains a court-house, a jail, two banks, an academy, and several places of public worship. The principal manufactures are those of shoes, leather, coaches, fancy chairs, and cabinet work. Morris Canal passes through Newark. In 1820 the population amounted to 6507, and in 1830 to 10,953.

NEWBALD CAPE, a projecting point on the northern coast of New Holland, near the entrance into the Gulf of Carpentaria.

NEW BEDFORD, a town of Massachusetts. See the article MASSACHUSETTS.

NEWBERN, a post-town and port of entry in North Carolina, North America. It is very pleasantly situated on the south-western bank of the Neuse, at the junction of the Trent. It contains a court-house and other public buildings, including several places of public worship. Being considered healthy, as well as eligibly situated for trade, Newbern enjoys considerable commerce, the exports being principally of grain, pork, lumber, and naval stores. A steam-boat plies between this place and Elizabeth city, and thus connects it with the great routes to the northward, and to Charlestown. The population in 1820 amounted to 3363, and in 1830 to 3776.

NEWBOROUGH, or **NEWBURGH**, a borough-town of North Wales, in the island of Anglesey, and hundred of Menai, 257 miles from London, and twelve from Beaumaris. It was once the residence of the princes of Anglesey, and a corporation founded by Edward I. There is a market, which is held on Tuesday. The population amounted in 1801 to 599, in 1811 to 750, in 1821 to 756, and in 1831 to 804.

NEW BRUNSWICK, a British province of North America, situated between the parallels of 45. 5. and 48. 4. 30. north latitude, and the meridians of 63. 47. 30. and 67. 53. longitude west of Greenwich. It is bounded on the north by the Bay of Chaleurs and the river Ristigouche, which separate it from Lower Canada; on the south by the Bay of Fundy and Chignecto inlet, which nearly insulate Nova Scotia, the latter being divided on the land side by a short boundary line; on the east by the Gulf of St Lawrence and Northumberland Strait, the latter separating it from Prince Edward Island; and on the west by the United States territory, from which it is separated chiefly by the river St Croix. The whole of New Brunswick contains an area of 25,324 square miles, or 16,207,360 acres. The greater part of this vast territory is still in a natural state, covered with dense forests and fine extended prairies, and intersected by numerous rivers and lakes, which afford ample means of inland navigation. Yet, with the exception of a few rocky districts, principally on the coast of the Bay of Fundy, and several not very extensive swampy tracts, the soil of this wilderness is rich and fertile. Its quality here, as elsewhere, may always be determined by the nature of the timber which it produces. Along the countless rivers, there are also innumerable tracts of what is termed here, and in other colonies in this quarter, "intervale land;" and from its being occasionally overflowed, and thus enjoying the advantage of alluvial deposits, it is also termed alluvial soil. In several parts of the interior, generally along small brooks, there are wild meadows, which owe their origin to the dams constructed by the beaver; which, by arresting portions of the streams, have caused the water to flow over the flat tracts of land. The aspect of New Brunswick is bold and undulating, sometimes swelling into mountains, and again subsiding into vales and

low lands. Its geology is but imperfectly known. Limestone, graywacke, clay-slate, and sandstone, occasionally interrupted by gneiss, trap, and granite, seem to prevail on the southern coast, the calcareous rock appearing to predominate. Along the shores which face Chaleur Bay and the Gulf of St Lawrence, gray sandstone and clay-slate predominate, with detached rocks of granite, mica, quartz, and ironstone. Specimens of amethyst, carnelian, jasper, and other stones, have been picked up in various places; and marble having fair pretensions to beauty abounds in at least one part of the country. Coal is plentiful in different localities, and iron ore is abundant. The other minerals found are copper, plumbago, and manganese. Salt springs are numerous, and some sulphureous or hepatic springs have lately been discovered.

"As we proceed from the sea-coast up the rivers of this province," says Mr M'Gregor, "the rich fertility of the country claims our admiration. A great flat district may be said to prevail, from the parallel of Long Reach, up the river St John, to the foot of Mars Hill. High hills occasionally rise in ridges in various places, but no part of New Brunswick can be considered as mountainous. The scenery of the rivers, lakes, and cataracts is generally picturesque and beautiful, and often wild and grandly romantic." The principal rivers are, the St John, the St Croix, the Petit Condiac, the Ristigouche, the Miramichi, and the Nipisighit, besides which there are innumerable inferior streams. The St John, called by the Indians Looshtook, or the Long River, is, next to the St Lawrence, the finest river in British America. From its source near the Chaudière, in Lower Canada, to where it falls into the Bay of Fundy, it has a course of six hundred miles, for about half of which distance it is navigable. It receives innumerable tributaries, and in some parts presents remarkable natural phenomena, which will afterwards be described, along with the other important streams, when we come to treat of the counties in which they are situated. The wild animals in New Brunswick are, bears, mouse-deer, the cariboo fox, loup-cervier, tiger-cat, racoon, porcupine, marten, beaver, otter, mink, musquash, fisher, hare, weasel, and others. Most of the birds and the fishes common to North America are also plentiful here. The climate may be pronounced very salubrious, and, generally speaking, more healthy than that of England. Consumption and rheumatism are the most prevalent diseases; but agues and intermittent fevers are rare, if not unknown. Sea-fogs frequently envelop the shores of the Bay of Fundy, and render the culture of wheat near the coast uncertain; but they do not appear to occasion any unhealthy tendencies. The temperature of the southern parts is much milder than that of those which border on the Gulf of St Lawrence, the Bay of Chaleur, and Lower Canada. The following is a meteorological return for Frederickton, the capital, situated in latitude 45. 57. and longitude 66. 45: Daily average for January, 17; for April, 40; for August, 69 $\frac{3}{4}$; for October, 47 $\frac{1}{2}$; for December, 13 $\frac{1}{2}$. Mean of the whole, 41 $\frac{5}{8}$.

New Brunswick is divided into ten counties, viz. Gloucester, Northumberland, Kent, Westmoreland, St John's, Charlotte, King's, Queen's, Sunbury, and York. The three counties first enumerated were originally comprised in one county, named Northumberland; and their characteristics are nearly the same. They have a sea-board along the Gulf of St Lawrence, the shore of which is low and sandy, covered with trees of a stunted growth, and skirted with extensive marshes, large and deep morasses, and long sand beaches, formed by the conflicting currents of the gulf and the various rivers which penetrate the shore. The coast line of the magnificent Bay of Chaleur has much the same character as the gulf shore. At its mouth, contiguous to New Brunswick, are the islands of Shipigan and Miscou. The former is about twenty miles long;

New Brunswick.

New
Brunswick.

is low and sandy, and produces bent grass, fir and birch trees, shrubs, and a great abundance of cranberries, blueberries, and other wild fruits. The soil is tolerably fertile, and the island is inhabited by Acadian French. Miscou island is about ten miles in circumference; and here the French once had an extensive fishing station, the remains of their buildings still being seen. The great river of the district just described is the Miramichi, which, from its position on the map, appears to be the great drain of the counties of Northumberland and Kent. It falls into the Gulf of St Lawrence in latitude 47. 10. north, and longitude 64. 40. west, forming at its estuary a capacious bay, with several islands, and a ship channel for vessels of seven hundred tons burden, which can navigate for upwards of thirty miles from the sea. The importance attached to Miramichi has arisen within the last twenty-five years, in consequence of the vast quantity of timber exported from it; and this has superseded almost every other pursuit. Upwards of two hundred vessels annually load with timber for Great Britain and other countries. Chatham, the principal seaport town of the district, is situated on the south-eastern bank, about twenty-five miles from the Gulf of St Lawrence; and on the opposite banks are the towns of Douglas and Newcastle. In 1825, this part of the country became the scene of perhaps the most dreadful conflagration recorded in the history of the world. The catastrophe was preceded by a fearful hurricane, which, sweeping through the forest, parched almost to tinder by an unusually hot and long summer, soon wrapped both sides of the river in one tremendous blaze, extending over more than six thousand square miles of country. Several towns, about five hundred human beings, and an inestimable amount of animal life, perished in the flames. Seven miles above Chatham the Miramichi divides into two great branches, and these again are broken into innumerable streams. The sea-coast of this river is low; but inland the country rises in some places, consisting of extensive and rich intervals, and in others, of a rugged, rocky territory. It is as yet but thinly peopled, having scarcely recovered from the desolating effects of the fire in 1825; but the establishment of the New Brunswick Company will no doubt gradually facilitate the settlement of this fine portion of the country.

Gloucester county, commencing about thirty miles north of the Miramichi, stretches along the shore round the island of Miscou, up the south side of the Bay of Chaleur, and onward to the sources of the Ristigouche. This river is about two hundred and twenty miles long, and forms at its estuary a large and commodious harbour. For upwards of two hundred miles from its embouchure it is above a mile in breadth; and from thence to within forty miles of its source, it is navigable for barges and canoes. The scenery upon this river is exceedingly grand and impressive; much of the territory is rich upland, skirted with large tracts of interval, and covered with a dense and unviolated growth of mixed wood, in which large groves of pine are very conspicuous. There are several other rivers of considerable size, as the Nipisighit and the Upsalquitch; but the county, notwithstanding its many natural advantages, is but thinly sprinkled with inhabitants, except along the shore from Nipisighit to Ristigouche. St Peter's or Bathurst, the county town, situated on the eastern side of Nipisighit, is a flourishing little settlement, provided with a commodious haven, where, for several years past, timber of most excellent quality has been shipped. Kent and Westmoreland counties present nothing that requires particular mention. They have both an extensive sea-board, several large rivers, and tracts of excellent soil. Two thirds of Westmoreland has a water frontier; and, forming, as it does, the only land communication between Nova Scotia and New Brunswick, it is a rich and valuable district.

New
Brunswick.

St John's county is bounded on the south and south-east by the Bay of Fundy, on the north and north-west by the King's county, on the east by Westmoreland, and on the west by Charlotte county. The corporate town, or city of St John, is situated on the southern declivity of a peninsula, and on the northern side of the entrance from the Bay of Fundy to the river St John, in latitude 45. 20. north, and longitude 66. 3. west. It is not the metropolis, although the largest town in the province, and the emporium of the greater part of its inland trade. St John's is a handsome place, but situated on rocky and irregular ground. The government and public buildings, which are numerous and built of stone, if not splendid, are handsome structures. Being an incorporated city, St John's is governed by a mayor, aldermen, and commonalty, who have an annual revenue at their disposal for the improvement of the city, which has a population of about 12,000 inhabitants. There is here a good and thriving bank, places of worship for various persuasions of Christians, some literary institutions and schools, and the society of the place has latterly much improved. The harbour is easy of entrance, capacious, and safe, with a lighthouse on a small island about the centre of the entrance. On the opposite side of the river, and under its municipal government, stands a pretty little town called Carleton. The upper part of St John's is named Portland, and the whole, including Carleton, is divided into six wards. There are always troops stationed here; and the barracks are spacious, handsome, and commodious. The country in the vicinity is stubborn, but, when subjected to cultivation, it is fertile. An extensive prairie of about 3000 acres, and occupying a space which is by some considered as the ancient bed of the river, lies near the town. The soil is remarkably rich and productive. About a mile above the city, the river St John passes through a fissure of solid and overhanging rock, exhibiting every appearance of having been formed by a convulsion of nature. Through this narrow passage of only 1300 feet the immense volume of water collected during a course of many hundred miles is compelled to pass, and occasions what are called the falls of St John, which foam and thunder through with tremendous violence. Navigation is thus rendered impracticable, except for four short diurnal periods. But the tide rises to a great height at St John's, and when the flood rises twelve feet at the fort, sloops and schooners pass in safety for about twenty minutes, and during the same space of time when the tide ebbs to twelve feet. Above the falls the river widens, and forms a bay of some magnitude, surrounded by high and rugged woodland. Passing up the bay, the country assumes a very grand aspect, high calcareous rocks and vast pine forests stretching up the sides of lofty hills and promontories. Still farther up is Grand Bay, where the same scenery prevails. From this extensive bay Kennebecakis Bay and River trend away to the eastward for nearly forty miles, twenty of which are navigable for large vessels. By another curve of the river a beautiful vista, of eighteen miles in length, called the Long Reach, is formed; and still farther up is Belle Isle Bay, a fine sheet of water, which here branches off for upwards of twenty miles to the westward. The St John then winds to the northward towards Frederickton, receiving the waters of the Washdemoak and Grand Lake from the east, and the Oromucto from the west. No part of America exhibits greater beauty or more luxuriant fertility than the lands upon each side, and the islands here situated. A great proportion of the soil is interval or alluvial, and coal is found in great plenty, so that it must ultimately become a very rich and populous country. Beyond Frederickton the river St John winds through a fertile and wooded country, and receives several large rivers in its course. One hundred miles distant from Frederickton is Mars Hill, interesting from the circumstance of its being

New
Brunswick.

the point fixed on by the British commissioners as the commencement of the range of high lands forming the boundary of the United States. The mountain is about three miles in length, with a base of upwards of four miles, and an elevation of 2000 feet above the level of the sea. The prospect from the summit is extensive and grand, embracing an undulating expanse of forest, varying in shade from the funeral green of the fir to the bright verdure of the birch. The next objects of any interest, as we proceed to the source of the St John, are the grand falls, where, for a mile, the river foams and boils through contracting walls of rock and over perpendicular precipices. Farther up there is a straggling colony of Acadian French at Madawaska, some miles above which the St John receives the waters of the Madawaska, which issue from the Lake Tamisquata, a sheet of water about thirty miles in length by two or three miles in width. It is only necessary to state with respect to this rich and fertile part of the country, that it is claimed by the Americans, who do not appear to have the shadow of a right to it.

York county, which is traversed by the river St John, is bounded on the north by the river Ristigouche, on the south by Charlotte county, on the east by that of Sunbury, and on the west by the United States. It is of great extent, but thinly settled, and in several parts little known. It is well watered by various rivers and lakes; and although the soil is in some places rocky, there is a large quantity of intervale or alluvial land, which, at the settlement of Madawaska and some other parts, is well cultivated. This county contains Frederickton, the metropolis of New Brunswick. This town is regularly laid out on the right bank of the river St John, which here forms an angle, enclosing the city on two sides; whilst on the land side, in front of it, stretches a chain of hills. The streets are disposed rectangularly, some of them being a mile in length, and for the most part composed of wooden houses. The public buildings consist of the province hall, where the provincial assembly and courts of justice congregate, the court-house, barracks, government-house, library, several churches, and other structures. The trade of Frederickton consists principally in selling British goods to the settlers along the river St John and its streams, and receiving timber and agricultural produce in return. Its situation as a central dépôt for commerce and military purposes is admirable, and it will doubtless increase rapidly with the advancing prosperity of the province. The population may be estimated at about 500.

The remaining counties of New Brunswick present little requiring special notice. Sunbury county contains some of the most productive tracts in the province, from being annually overflowed by the St John. These parts of the country exhibit a most luxuriant scene during harvest. Sunbury is computed to contain 40,000 acres of pasturage and tillage ground, and upwards of 20,000 of meadow ground. Contiguous to it, but lying on both sides of the river, is Queen's county, which is extensively fertile, and yields fine timber, in large quantities, for ship-building. The same remarks apply to King's county, which embraces the whole of Belle Isle Bay, the Long Reach of St John, and the estuary of the Kennebekacis, including Long Island and Kennebekacis. Charlotte county, opposite to St John's, on the other side of the river, contains the well-laid-out town of St Andrews, which has about 5000 inhabitants. This district abounds with spacious, excellent, and easily accessible harbours. Connected with it are the islands of Campo Bello, Grand Manau, and Deer Island. Campo Bello, about eight miles in length by two in breadth, is in a high state of cultivation. Grand Manau, near the entrance of the Bay of Fundy, is twenty miles in length by about five in average breadth. A great part of it is cultivated; the herring fishery is extensively pro-

New
Brunswick.

secuted on its shores; and from its situation, commanding the entrance to the Bay of Fundy, it is valuable as a defensive position. Deer Island, lying at the entrance of Passamaquoddy Bay, is studded with numerous islets, some of which are richly wooded. This noble bay has the advantage of being free from ice to a greater extent inland than any other harbour north of New York.

Agriculture is yet in its infancy, and can scarcely be said to have existed till 1825, about which period agricultural and emigrant societies were formed; and since then a desire to bring the soil under culture has been gradually diffusing itself over the province. In the interior all kinds of grain and vegetables arrive at full perfection, and on alluvial lands yield great returns. Heretofore it has been necessary to import grain and flour for home consumption; but this cannot long continue in a country where the necessaries of life may be so readily procured. Of agricultural stock, the number of horses is estimated at 12,000, that of horned cattle at 87,000, hogs 65,000, sheep 105,000, whilst the number of acres of land under cultivation is about half a million. The staples of the province are timber and fish. The felled trees are cut up into square timber, deals, spars, and staves, for which purpose an immense number of saw-mills are required. In 1833 the number of establishments for sawing deals in New Brunswick was 228, the estimated quantity of lumber sawed at which during the same year amounted to 103,840,000 feet. The amount of shipping employed in the timber trade is necessarily very great; and for this reason the province assumes an importance which it does not seem to possess, considering the number of its inhabitants. In the year 1834 there entered inwards from Great Britain, the colonies, and foreign states, 3102 vessels, of 304,929 tons burden. In the same year there went outwards 2605 vessels, of 316,214 tons burden. A considerable whale fishery has commenced, and several large vessels proceed from New Brunswick to the Pacific and Eastern Oceans for seals, sperm, and black whale oil. In 1833 there were employed in the coasting trade 550 vessels of 34,780 tons burden. During the same year there were fishing for bounty thirty-five vessels of 1615 tons burden, and not for bounty twenty-eight vessels of 1048 tons burden. For the year ending January 1833, the total imports amounted to L.590,488, and the total exports to L.411,572. The trade of this province consists chiefly in exporting square timber, deals, spars, staves, and a few firs, to Great Britain and Ireland, in return for British manufactures; and also in shipping boards, shingles, scantling, and fish to the West Indies, for which rum, sugar, tobacco, and dollars, are brought back. Gypsum and grindstones are shipped on board of American vessels, and flour, meal, bread, and even Indian corn, are received in exchange; a trade which reflects little credit on the industry and enterprise of the New Brunswickers, who possess so much valuable soil capable of producing all kinds of grain.

The constitution of this province is similar to that of the other North American colonies, except that the lieutenant-governor's executive council of twelve have also a legislative capacity, which is not the case in the Canadas. The house of assembly consists of twenty-eight members, sent by the different counties. The provincial parliament sits for about two months during the winter at Frederickton. The laws are administered by a supreme court and minor tribunals. The former has a chief justice and three puisne judges. There are also courts of chancery, vice-admiralty, and for granting probates of wills, and for other purposes. The revenue of New Brunswick is chiefly derived from duties levied on the importation of goods at the several ports of the province. The grand total revenue of the province in 1832 was L.68,769. The expenditure was about the half of that sum, the surplus being laid out

Newburgh. in the construction of roads and bridges, in which the province was greatly deficient, and for the purposes of education. Grammar schools, and those on the Madras system, are established in all the settlements; and a college has been built under the auspices of Sir Howard Douglas, to whom the province is otherwise much indebted. The established church is within the diocese of Nova Scotia, to which persuasion there belong twenty-six churches, each having one clergyman, and the whole being superintended by an archdeacon. The Presbyterians, Methodists, Baptists, Roman Catholics, and others, have also places of worship. There are eight newspapers published; and altogether the social aspect of New Brunswick is as promising as that of any of our North American colonies. The improvement of the province will be greatly accelerated by the New Brunswick Land Company, which was established in London in 1832. This company purchased from the crown 500,000 acres of fertile inland territory, at 2s. 6d. per acre, which is in the course of being disposed of by the board of management established in London. The population of New Brunswick in 1824 amounted to 74,176, and in 1836 it had increased to 119,457. It appears that the legislative assembly has passed a bill for the support of the civil government of the province, in conformity with the terms prescribed by the head of the colonial department in this country; and that the crown has, in consequence, surrendered to the legislature the casual and territorial revenues of the province. The history of this province is comprehended in that of *NOVA SCOTIA*, to which article the reader is referred. (R. R. R.)

NEWBURGH, a royal burgh and parish of Scotland, in the county of Fife, advantageously situated on the south side of the river Tay. The town seems to be coeval with the abbey of Lindores, and was early created a burgh of regality under the abbot of that place. In the year 1457 it was erected into a royal burgh, and the charter was again renewed by Charles I. in the year 1631. The royalty extends over 400 acres, of which 178 imperial acres belong to the burgh. The town of Newburgh may be said to have been entirely rebuilt within the last fifty years. It consists of a single street of considerable length, which has been levelled to a gentle slope, the side paths being neatly paved. This street is parallel with the course of the river; and from its centre a by-street leads down to the harbour, which formerly consisted of three continuous piers, projecting into the south deep of the river; but towards the east two additional piers were lately erected, on which have been built several dwelling-houses, store-houses, granaries, and other conveniences for commerce. A new town-house was erected in 1808; and there has recently been attached to it a building of considerable dimensions for the accommodation of those engaged in the stock-market. The new parish church was erected in 1833; it is in the Gothic style, and is a handsome and elegant structure. There is also a meeting-house of the United Associate Synod, which is a plain and commodious edifice. The whole of the buildings are constructed of the greenstone trap found in the parish. The town is lighted with gas. The principal employment of the inhabitants is connected with the linen trade, which is in the hands of a few individuals, who not only employ all the weavers in Newburgh, but furnish work for great numbers in the different villages throughout Fife. They also export their goods directly to the West Indies and South America. There is here a considerable trade in corn; and Newburgh divides with Kirkcaldy the exporting of the grain and other agricultural produce from Fife. There are only ten vessels, from sixty to a hundred and fifty tons burden, that belong to Newburgh, and these are chiefly engaged in the coal trade; but vessels from all quarters land and take in their cargoes here. Besides, those bound for Perth must often

wait for the flowing of the tide, and many of them have to unload part of their cargoes before proceeding. The river here is about two miles broad, and ships of 500 tons burden can reach this port. Operations have, however, been commenced on an extensive scale to contract the river, as well as to deepen it by dredging. Salmon fishing is carried on to a considerable extent, and affords employment to about sixty of the weavers of the place during the summer months. The fish are shipped for London by one of the Dundee steamers. The principal objects of interest in the parish are the remains of the celebrated abbey of Lindores, which was founded in the year 1178; Mugdrum's Cross, a little to the westward of the town; and Macduff's Cross, about one mile to the south. The value of the raw agricultural produce of the parish is about L.6000 a year; and the sum annually expended in the manufacture of linen in the town amounts to about L.128,500. The debt of the burgh is nearly L.1650. Its yearly revenue is about L.170, and its yearly expenses amount to nearly L.100. The burgh is governed by two magistrates and fifteen councillors. The population of the parish and burgh amounted in 1811 to 2118, in 1821 to 2190, and in 1831 to 2642. The parliamentary burgh voters give their suffrages in the election of a member for the county of Fife.

NEWBURY, a market-town of Berkshire, in the hundred of Faircross, fifty-three miles from London. It is situated in a beautiful valley, through which runs the river Kennet, which being joined by a canal with the Avon, forms a water communication between Bristol and London. The great road to the former city is at the end of this town. It was famous for its woollen trade in the reign of Henry VIII.; and it is related that Jack of Newbury sent one hundred of his clothiers, armed at his own expense, on the expedition which terminated in the battle of Flodden. Several of the public buildings and charitable endowments were founded by the same individual. That trade by which his wealth was gained has disappeared. The town is well built, the streets are wide, and the buildings handsome. The principal trade is that which arises from the transit of goods on the canals and the river Kennet. It was incorporated by Queen Elizabeth, and is governed by a mayor, four aldermen, and eleven councillors. There is a good parish church, and several dissenting meeting-houses. Near this town two battles were fought during the civil war between Charles I. and the parliament. There is a large market, which is held on Thursday. The population amounted in 1821 to 5347, and in 1831 to 5959.

NEWCASTLE, a small market-town of South Wales, in the county of Carmarthen, 216 miles from London. It stands on the river Teifi or Tawy, and is situated in a dreary mountainous district, but has a well-attended market on Monday. The fine castle which stood here is now in ruins.

NEWCASTLE is also the name of a handsome town in the county of Limerick and province of Munster, on the high road to Kerry, 145 miles from Dublin. It consists of a large square, where markets and fairs are held, and possesses a handsome church, Catholic chapel, market-house, and barracks. Here the knights templars formerly had an establishment, the ruins of the walls and fortifications of which still remain. The population at last census amounted to 2866.

NEWCASTLE-UNDER-LINE, a town of the county of Stafford, in the hundred of Pirehill, 149 miles from London. It is situated on a small branch of the Trent. It had once four churches; but these, with much of the town, were destroyed in the civil wars. The chief trade of the town consists in making hats; but as coal is abundantly obtained near it, a great quantity of pottery ware is made in the neighbourhood. It is a corporate town, governed by a

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Newcastle-upon-Tyne. mayor, two justices, and twenty-four common council men, and returns two members to parliament. It has a good market on Monday. The population amounted in 1801 to 4604, in 1811 to 6175, in 1821 to 7031, and in 1831 to 8192.

NEWCASTLE-UPON-TYNE is an extensive and wealthy town in the county of Northumberland, of which it is the metropolis; but it is also a county of itself. As its name denotes, it is situated on the river Tyne, to which circumstance it is principally indebted for its flourishing condition. That river is formed out of two branches, one called the North Tyne, which rises upon the borders of Scotland near Kielder, and, after passing Falstone, Greystead, and Bellingham, receives the water of the river Reed, and near Woodburn is joined by the South Tyne, which rises behind Crossfell, on the borders of Cumberland, and passing Haltwhistle, forms the united stream at Warden near Hexham. The mass of water then passes Newcastle, and empties itself, after a course of near seventy miles, into the German Ocean, between the towns of North and South Shields, which stand on the banks at the mouth of the river. At the extreme point on the northern bank is the town of Tynemouth, with its haven. This latter place is known to seamen in the day by a castle in ruins on the northern side, and in the night by a revolving light, which is constantly kept burning, and exhibits a face every minute.

Within the river, near the town of North Shields, there are two lighthouses for the use of vessels passing over the bar. There are three warping buoys within the river, two on the south and one on the north side; and in addition to these, there is a distinguishing buoy on the north side, where the low light is situated. The tide flows up the Tyne from Shields to a distance of eighteen miles; and at Newcastle Bridge it generally runs upwards about four hours and a half, and downwards about seven hours and a half. The perpendicular rise at the bar, at Tynemouth is about eighteen feet, and at the bridge from eleven to twelve feet. It is high water on the bar, at the full and change of the moon, at about three o'clock if the weather be settled; but a strong northerly wind will sometimes make it high water an hour sooner, and a strong southerly wind an hour later, than the regular course; and there will be at times two or three feet more water on the bar with a strong northerly wind than with a strong southerly one. The corporation are making great exertions to improve the navigation of the river, and employ a powerful steam-engine for the purpose of dredging.

Due precautions against accidents to shipping have been rendered necessary by the vast number of vessels that pass up and down the Tyne; and an association, formed in 1825, at the Trinity House, has for its object the preservation of lives from shipwreck, and the maintenance of a life-boat at South Shields. The pilots on the river are remarkable for their skill and carefulness, and are under the regulation of the corporation of the Trinity House, who have an office on the quay. The bridge was founded in very ancient times, and consisted of wood. It was once burnt, and at subsequent periods was more than once carried away by the floods. The existing bridge was built between the years 1775 and 1799. It was only twenty-one feet wide, which, as the population and trade increased, was found very inconvenient; and in 1801 it was enlarged and widened, and is now thirty-three feet six inches in width. It connects the town of Newcastle with its suburb Gateshead, which is in the county of Durham.

From the bridge a fine quay extends along the river 500 yards in length. The new corporation have commenced a most important improvement, by lengthening the quay one thousand yards eastward, and a still greater extension is intended. When completed, it will make this the finest quay, for commercial purposes, in Europe. The buildings

on the quay consist of shops, warehouses, and taverns; the custom-house stands on the quay, and in lanes leading from it there are a number of extensive warehouses belonging to private merchants, and also a large bonding tobacco warehouse under the care of the custom-house.

Newcastle is to be chiefly viewed as a trading town; and as the principal foundation of its trade is the shipping of coals, we shall first take a view of the growth and extent of that branch. It is doubtful when coals were first discovered and applied to serve as fuel; but by some ancient documents it seems to be shown that in the year 1280 the revenue of this town arising from the sale of coal amounted to L.200 per annum. In 1306 it must have been introduced in London, as the parliament complained to the king of its infecting the air with noxious vapours, in consequence of which the use of coal was prohibited, and strict orders given to destroy all furnaces and kilns in which it was used. Coals, however, must have again come into use in 1327, as at the coronation of Edward III. a debt appears to have been due for this mineral; and in the same reign orders were issued relating to the measuring of coals, and such as were got in the field of Gateshead were to be taken across the Tyne in boats, and, after paying the custom-duty, to be sent to any port of the kingdom, but to no port out of the kingdom, except to Calais. About the year 1338 the prior of Tynemouth granted colliery leases. In the year 1582 Queen Elizabeth obtained a lease for ninety-nine years of the manors and royalties of Gateshead and Whickham for L.90 per annum, which caused the price of coals in London to rise to nine shillings the chaldron; upon which the lord mayor made application to Lord Burleigh that the price might be reduced to seven shillings. In 1615 the trade appears to have employed 400 sail of ships, some of which sailed to France, and others to the Netherlands. During the civil wars the trade and the prices of coal fluctuated much, as at one time London was with the parliament and Newcastle with the royal party. In 1675 the shipping of Newcastle was estimated at 80,000 tons. In 1710 the annual average export for the three preceding years had amounted to 178,143 chaldrons, and in 1776 to 260,000. The following account will show the vast but gradual increase since that time.

An Account of the quantity of Coals shipped at Newcastle from 1794 to 1836, distinguishing those sent Coastwise and those over Sea.

Year.	Coastwise. Chaldrons.	Over Sea. Chaldrons.
1794	388,724	39,935
1800	537,793	47,487
1805	552,827	49,572
1810	632,299	17,258
1815	650,209	42,834
1820	756,513	44,826
1825	687,029	51,444
1826	792,365	62,620
1827	683,745	65,417
1828	725,082	59,325
1829	738,426	61,653
1830	817,870	74,456
1831	772,686	60,848
1832	682,797	74,467
1833	699,741	73,186
1834	761,306	85,828
1835	853,359	116,803
1836	858,403	155,357

The preceding account is given in Newcastle chaldrons, which weigh fifty-three hundred, but the London chaldron

Newcastle-weighs only twenty-eight hundred. The former contains
upon- sixty-eight, the latter thirty-six Winchester bushels. Since
Tyne. the duty on coals water-borne has ceased, the account of
the quantities shipped has been kept with less correctness.

It may be observed in this place, that whilst describing the shipping and trade of Newcastle, the transactions of the towns of North and South Shields, and of Tynemouth, are comprehended, as far as regards the official returns, because these returns are taken from the books of the custom-house, which is at Newcastle alone. These towns, which are a portion of the port, contain together nearly 30,000 inhabitants. The larger ships are, in fact, mostly loaded and discharged near them, though vessels of 300 or 400 tons burden may at high water reach the bridge between Newcastle and Gateshead. The whole extent of the port is such that two thousand sail of vessels may lie in a state of security within its limits.

It is very difficult to estimate with accuracy the proportion which the coals raised in the vicinity of Newcastle, and shipped from its port, bears to the whole quantity raised in the kingdom. We must trust to estimates by no means deserving of implicit confidence, when we state that the trade of digging coals, and of conveying them to the ships, gives in this vicinity employment to 75,000 persons; that a capital amounting to L.4,000,000 is invested in it; that the weekly value of that which is sold amounts to L.60,000; and that the duty paid on it in 1831, when it ceased, was about L.600,000.

As Newcastle is a kind of metropolis to a considerable portion of the northern counties of England, it has very extensive commerce in almost every other branch of trade. It has, however, one branch of most extensive value, as connected with our naval defence, that of ship-owning, under which some of our best operative seamen are trained up with a skill, activity, and perseverance that is exceeded by no sailors in the world. The extent of this branch of industry may be seen by the following table.

Vessels registered at the Port of Newcastle.

Years.	Number of Vessels.	Tonnage.	Number of Men and Boys.
1821	822	178,047	8,369
1825	909	193,014	8,752
1830	986	203,587	9,496
1834	1097	219,640	10,173
1835	1076	211,173	9,806
1836	1080	213,907	.....

It has been estimated that this town has belonging to it one sixteenth part of the whole tonnage of the British empire. In the year 1836 there were registered in the port of Newcastle ninety-one steam-vessels.

If the amount of duty collected at the custom-house be the proper scale by which to measure the foreign trade at the respective ports of the kingdom, Newcastle stands the fifth on the scale of English towns, and next after London, Liverpool, Bristol, and Hull. In 1836, the annual net amount was L.275,369. 9s. 4d.

In Newcastle and its neighbourhood are carried on various important manufactures, which are chiefly fostered by the abundant supply of coal. Amongst these may be enumerated glass bottles and crown and plate glass, patent shot, and all the preparations of lead, whether for pigments or otherwise. The manufacture of iron is carried on upon the most extensive scale, as is the construction of steam-engines, especially those of a locomotive kind, the reputation of the builders being so high that they manufacture not only for all parts of England where railways are established, but also for the continent of Europe and

the United States. Mills for the crushing of linseed, manufactory of copperas, coal pitch, spirits of tar, varnishes, soda, aquafortis, whitening, glue, vinegar, and soap, are numerous and extensive.

Since the year 1816 a most important business has arisen in the neighbourhood of Newcastle, namely, the making of crystals of soda and mineral alkali by the decomposition of common salt. For such a manufacture, as well as those of glass and iron already noticed, the banks of the Tyne are, it is true, most favourably circumstanced; but the history of its establishment is curious, and affords an instance of the way in which important trades sometimes owe their origin to little more than individual energy and enterprise.

In the year 1794, Lord Dundonald, who had previously directed his attention to various chemical manufactures, represented to Mr William Losh of Newcastle, the advantage, as he conceived, of a process of his own for making alkali by the decomposition of certain refuse salts; and accordingly a company was formed, consisting of Messrs John and William Losh, and Messrs Surtees, bankers, under the firm of William Losh and Company, who began the trade of making alkali at Bell's Close, on the Tyne, three miles above Newcastle. The refuse salts procured were sulphate of potash from makers of oil of vitriol, and sulphate of soda from makers of marine acid, both of which were at that time to be obtained in great plenty; and Lord Dundonald's process was to decompose them by saw-dust, forming alkaline sulphurets, which, by lixiviation, evaporation to dryness, and exposure to heat, with more carbonaceous matter, he expected to convert into carbonated alkali. In this, of course, he failed; but it is interesting to observe how nearly his lordship approached to success; for if in the first part of his process a little lime had been used, the decomposition would have been accomplished exactly as it is at present. Lord Dundonald then proposed to decompose muriate of soda by potash, obtaining thus carbonate of soda and muriate of potash, both valuable products; and this mode of obtaining soda from common salt was pursued for some time. At the end of little more than a year from the establishment of the works at Bell's Close, Lord Dundonald, who was not a partner, left the neighbourhood of Newcastle. At this time there was known to exist in a colliery at Walker, three miles below Newcastle, a salt spring of very great strength and copiousness, capable, it was said, of furnishing salt enough to supply the consumption of the whole kingdom; and Lord Dundonald, previously to leaving Bell's Close, made the important suggestion to William Losh and Company, of endeavouring to obtain from government a grant of salt for the purpose of making alkali, duty free, from this spring at Walker. Accordingly the application was made, and the company succeeded, in the year 1796, in obtaining a grant of salt to be made from this salt spring, at a duty of thirty shillings per ton. The present alkali works at Walker were soon afterwards commenced, and the establishment at Bell's Close discontinued. Here alkali-making was carried on from potash as above mentioned, and also for some time from oxide of lead, until, about the year 1799, the price of lead became too high to admit of its continuance. About this period the works at Walker became the property of Mr John Losh of Woodside, Cumberland, and were placed under the entire management of his brother, Mr William Losh, who soon afterwards made many important alterations, and who may justly be considered as the father of soda-making on the Tyne. But it is not suitable in this article to trace very minutely the history of soda-making, and it may be sufficient to say, that at Walker the trade was carried on gradually increasing until the year 1816, when Mr William Losh visited France, and brought from thence the process

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Tyne.

Newcastle-upon-Tyne. now followed universally, which he immediately put into operation at Walker.

This process, for which we are entirely indebted to our intelligent neighbours the French, consists in making oil of vitriol from sulphur, and with the sulphuric acid decomposing muriate of soda, to obtain dry sulphate of soda, which salt is mixed with certain proportions of chalk and coal in powder, and the whole heated in a proper furnace until a sort of incipient fusion takes place, after which the mass is drawn out and suffered to cool, forming an impure carbonate of soda called ball alkali. This ball alkali being lixiviated, boiled down, heated in a furnace to redness, with or without carbonaceous matter, again dissolved, and crystallized, yields the soda of commerce. From 1816 to 1822 alkali-making was carried on only at Walker; but at the latter date Messrs Cookson and Company commenced the manufacture at South Shields, and were speedily followed by other enterprising individuals at various places on the Tyne.

At present there are nine soda manufactories on the Tyne, at which upwards of 1000 workmen are employed; and the quantity of crystallized soda made per week is upwards of 250 tons, besides at least 100 tons of alkali or soda ash, containing from 25 to 45 per cent. of soda, which is sold in an uncrystallized state to bleachers, soap-makers, and others. To produce this quantity of alkali there is burned into sulphuric acid per week 120 tons of sulphur, and the common salt decomposed weekly amounts to nearly 400 tons. The price of crystallized soda was, in the early days of alkali making, 60s. per cwt.; but it is now sold at one fifth of that sum, or 12s. per cwt.; and as society are only beginning to experience the usefulness of the article for domestic purposes, and the demand is consequently likely to increase, it is probable that this branch of manufacture on the Tyne has not yet reached its fullest extent.

The town is supplied with excellent beer from several breweries, which together make about 30,000 barrels of strong, and about 18,000 barrels of small beer, and use in the fabrication about 19,000 quarters of malt. Paper of various kinds is made, and some of it printed; and there are a great number of coaches and other kinds of carriages built. The spinning of linen and woollen thread employs about 300 persons, but chiefly in the surrounding villages, and the salmon fishery on the Tyne is considerable. From this sketch of the numerous products of industry, the export trade may be seen to be extensive in other articles besides coals, cinders, culm, the preponderating commodities of this important trading town.

The imports are various, but the principal articles are corn, wine, spirits, fruits, sugar, tobacco, tea, coffee, butter, cheese, tallow, hides, oak-bark, rags, flax, hemp, linen yarn, mahogany, deals and other timber, spars, masts, cordage, tar, iron, and what is necessary for the equipment of shipping. This view of exports and imports accounts for the number of vessels which have entered this port in successive years from foreign countries.

The municipal government of Newcastle has from a very remote period been conducted by an incorporated body originating in royal charters, and composed of a mayor, aldermen, and common councilmen, with various subordinate officers. Having been originally a Roman station, it became under the heptarchy a regal villa, one of the residences of the Northumbrian kings, styled by Bede, *Ad murum regia villa illustris*. It afterwards obtained the name of Monkchester; but soon after the Conquest, on the construction of a new fortress, it acquired the name which has been continued to the present time. William II. converted the town into a royal borough, conveyed to the burgesses considerable fee-farm rents, and conferred some privileges which were extended by Henry I. Several additional immunities were granted by

VOL. XVI.

successive charters, all of which were, in the reign of Newcastle-upon-Tyne. Elizabeth, in 1660, condensed and confirmed by what was known then as the great charter; and that, being afterwards slightly changed in the reign of James I., continued till the passing of the existing law in 1835. By that law the town has been divided into seven wards for the purposes of that act, and has now fourteen aldermen, forty-two councillors, a mayor, and sheriff, with justices of the peace nominated by the crown.

The revenue of the corporation is very large, arising from a tonnage on coals, a duty for depositing ballast, actual possession of land and houses, and some other sources, amounting together to L.40,000 per annum. The corporation has the superintendence of the river Tyne, which, with the other necessary expenses, and interest on loans, amounts to nearly the same as the income. Besides the corporation, there are many guilds or companies having chartered privileges, and halls for their assembling. There are the Twelve Mysteries, founded between the years 1215 and 1621; the Fifteen By-trades, founded between 1426 and 1626; and the various companies, eight in number, created at different periods, like the others, between the years 1454 and 1675. These companies choose annually sixty-nine stewards, out of which a body of nine is nominated, who are called the Herbage Committee, whose duty it is to superintend the improvement and enforce the regulations respecting the free commons, upon which the burgesses have the privilege of pasturing two cows each, and a free pasturage is thus afforded to 700 fine cows, and also to watch over the interests of the freemen, and of their respective fraternities. They have a revenue of about L.100, derived from ground and dunghill rents, and from other sources.

Newcastle is a county of itself, and the courts of assize and nisi prius are held twice a year for each division; those for the town at the guildhall at the Exchange, and those for the rest of Northumberland in the county courts at the Castle Garth. They are held at the same time. There are also some inferior courts of justice held, such as the mayor's court, in which only free burgesses or their widows are sued, and in which are tried all cases relating to real or personal actions to any amount arising within the town; the sheriff's court, in which all actions are brought as in the mayor's court, but with this distinction, that they may be instituted against all other persons than free burgesses; the court of conscience to determine all debts or actions not exceeding in amount forty shillings, which extends to all persons residing within the liberties of the town; and the court of guild, the chief business of which now is the admission of persons to their freedom, whether they are entitled to it by birth, or by an apprenticeship during seven years. Besides these, a court of admiralty is occasionally held, the principal duties of which consist in preventing injury from being done to the river or to the salmon fishery. The corporation have lately established a body of police upon the London plan, which has been found very effectual.

The population of Newcastle has advanced in nearly the same proportion as that of the other towns of the kingdom. It appears, by the comparative account of the population of Great Britain in the years 1801, 1811, 1821, and 1831, printed by order of the House of Commons, 19th October 1831, that the number of the inhabitants at those periods amounted in 1801 to 28,366, in 1811 to 27,587, in 1821 to 35,181, and in 1831 to 42,760. But each of these accounts is materially deficient, owing to their exhibiting only the number of inhabitants within the limits of that portion of the town which is within the county of the town of Newcastle, and not giving the numbers of the town of Gateshead, which, though one of the suburbs, is within the county of Durham, nor the population of those parts of the

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Newcastle-upon-Tyne. parishes of the town which are not within the limits of the county. By the enumeration abstract of the population, ordered by the House of Commons to be printed on the 2d April 1833 (vol. i. p. 472), the population is thus shown :

Parishes.	Males.	Females.	Total.
All-Saints.....	7887	9176	17,063
St Andrews.....	4984	6452	11,436
St John.....	3912	4223	8,135
St Nicholas.....	2877	3249	6,126

	19,660	23,100	42,760
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To this must be added the inhabitants of Gateshead in the county of Durham, which is a suburb only divided by the bridge..... 15,177

Besides this must be added that portion of the parish of All-Saints which is in the east division of the ward of Castle..... 5,677

Those portions of St Andrew's parish which are in the east and west divisions of the ward of Castle..... 2,424

The portion of St John's parish which is in the west division of Castle Ward..... 5,061

Total number of inhabitants in 1831..... 71,099

If the past rate of increase has been maintained since that period, the whole population at the present time must exceed 80,000 persons.

The public buildings for religious purposes are numerous. Those of the established church claim the first attention. Of these, the mother church of St Nicholas is probably the oldest, and certainly the most striking. It was founded in the year 1091, by Osmond, bishop of Salisbury, and placed under the jurisdiction of the bishop of Carlisle. The edifice was burned in 1210, and the present structure finished in 1359. The interior of the church is 242 feet, and on entering it by the great western door, the spectator is struck with mingled impressions of delight and solemnity, from the general and noble effect produced by the view. Some considerable improvements in the arrangement of the pews made in 1783 have adapted it for accommodating a congregation of more than 1200 persons. The organ is a remarkably fine instrument. The frame-work is mahogany, and the two pillars in front are magnificent; the centre is surmounted by the figures of two recumbent angels, and the compartments of the front are embellished with a variety of richly gilt pipes. There are several fine specimens of modern sculpture lately erected on this edifice, and these marble monuments have been very costly. A public library is attached to this church, formed by donations at different periods since the year 1661, but principally by Dr Thorburn.

St John's church is an ancient structure, and supposed to have been built in the latter end of the thirteenth century; but it has since been enlarged and beautified at different periods. The great eastern window contains some curious ancient specimens of stained glass. By the erection of some new galleries and other arrangements of pews, it has been made capable of seating, including scholars in the aisles, more than 1400 persons. It has a square steeple with four pinnacles, a clock and six bells, with a large burying-ground adjoining.

St Andrew's church is said to have been built by David king of Scotland, who died in 1153. It still exhibits some specimens of Anglo-Norman architecture, though many alterations have been made at different periods. Being near the town wall, it suffered much during the siege of 1644, and was long afterwards closed. It has lately been furnished with a new organ, and the interior so arranged as to accommodate 1300 hearers, besides 200 children. Near to it is the burying-ground, which, by the destruction of some

houses in 1824, is laid open to public view, and handsomely surrounded by palisades.

All-Saints' church is a modern structure, having been erected between the years 1786 and 1796, at an expense of L.27,000, raised by an assessment upon the owners of houses in the parish. It has a stately Doric portico at the entrance, from which there rises an elegant spire to the height of 202 feet from the ground. It has a fine set of bells and a clock. It contains a spacious gallery, and the whole seat-room will accommodate near 1200 persons, and 270 children of the charity schools, who have seats in the gallery. This building was erected on the site of an ancient church which existed before the year 1284, but which was considerably larger, and capable of containing 2000 persons.

St Ann's church is, properly speaking, a chapel of ease to the parish of All Saints. It was erected in 1768, on the foundation of an ancient building, at the expense of the corporation. It has a large school attached to it, in which boys are instructed in reading, writing, and arithmetic, on very cheap terms. The church has seat-room for about 500 persons.

St Thomas' church is a chapel of ease to the parish of St Nicholas. It was begun in 1828, and finished in 1830. It is an elegant structure, built in the style of one of the earliest examples of ecclesiastical architecture. The church is 135 feet in length and sixty-three feet in breadth, and has a tower 138 feet in height. It can accommodate from 1000 to 1100 persons. In the suburb or town of Gateshead is the church of St Mary, a new steeple to which was built on an old foundation in 1740. Its chief ornament is an elegant window of stained glass in the southern transept, which was presented to it in 1824. There is seat-room for 800 persons, including that for the charity children.

The places of worship for the various classes of dissenters from the established church are numerous. From the vicinity to Scotland, the adherents of the Presbyterian form of worship are the greatest in number, occupying nine meeting-houses, most of them being of the Scotch kirk, and others secessions from it. The next largest portion of worshippers are the Wesleyan Methodists of the new and old connection, who have six chapels, one of them the largest place of worship in the town. The Independents occupy three chapels, the Baptists three, and the following persuasions one each, viz. the Roman Catholics, the Quakers, the Glassites, the Unitarians, and the Swedenborgians.

To the enterprise of Mr Richard Grainger the inhabitants of Newcastle owe the creation of almost a new town, built in a style of architectural beauty not inferior to any in the kingdom. After having built Eldon Square, Blakett Street, and several others of minor importance, Mr Grainger's first exertions in an embellished style of architecture were made on a large piece of ground adjoining the Leazes. Upon this he erected a parallelogram, consisting of upwards of fifty houses, all faced with polished stone, and of great elegance of design, and some of them of large dimensions. This undertaking was carried through by him at the same time that a spacious and splendid arcade was constructed in the centre of the town. The next attempt of this individual was more gigantic, and incurred an expenditure of half a million sterling. There existed in the very centre of the town a large piece of ground, about thirteen acres, which had originally been the gardens of the Grey Friars, and of a convent of Benedictine nuns, but some time ago was the garden of the house of Sir Walter Blakett, Bart., and, latterly, of Major Anderson. This completely cut off the communication between the opposite sides of the town, except by circuitous streets, and was partly occupied by stables, cow-sheds, and other nuisances. Mr Grainger conceived the idea of covering this

Newcastle-upon-Tyne.

Newcastle-upon-Tyne. extensive piece of ground with houses and markets of elegant construction. The purchase of the ground was effected, and the work begun, in the summer of 1834; and its completion will probably not require more than twelve months from the present time (1837). This extraordinary undertaking consists of seven streets, some of them eighty feet broad, and all of stone, and highly embellished; besides a butcher-market and a vegetable-market, which alone occupy a space of more than two acres, and are entirely covered in. These markets are unquestionably the most elegant and commodious in the world. The butcher-market consists of four avenues, nineteen feet four inches wide, twenty-seven feet high, and extending in length 338 feet. The vegetable-market is connected with the butcher-market, and consists of one stupendous hall, 318 feet long, fifty-seven feet wide, and upwards of forty feet high. A new theatre of great architectural beauty, a chapel for the Methodists of the new connection, a new dispensary, and a church, are also included in the plan. The number of houses will exceed 300. Such are the outlines of what has been done, and is in the course of completion. At the top of the principal street, named Grey Street, in honour of Earl Grey, workmen are at present (1837) employed in building a column, which will be 150 feet high, and surmounted by a statue of Earl Grey. This elegant memorial is from a design by Messrs John and Benjamin Green of Newcastle, and the statue is by Bailey of London. The cost is defrayed by public subscription. Within the last ten years there has been erected a large and massive building for the jail and house of correction, which cost L.49,000; and during last session of parliament an act was passed by which twenty new streets are to be made and altered.

Newcastle is quite as well supplied with those institutions which tend to the acquisition and diffusion of knowledge as any other place of its extent in the kingdom. The Literary and Philosophical Society was founded in 1793. Its objects were the discussion of the several branches of polite literature, and making inquiries into the situation and properties of the mineral productions of the neighbourhood, with the elucidation of the sciences applicable to commerce, antiquities, local history, biography, nautical inquiry, and other subjects. A new institution for delivering lectures has been united with it since 1802. A library of more than 12,000 volumes has been collected, and a valuable apparatus purchased for the illustration of chemistry and other branches of physics. The Natural History Society has erected an elegant building, which contains a museum of very great value. The published Transactions of this Society have raised the character of its members to a high rank in that science. In the same building the Newcastle Antiquarian Society hold their meetings.

There is also an establishment recently formed, called the Literary, Scientific, and Mechanical Institution, of which young persons may become members, and attend classes appointed for drawing, mathematics, chemistry, and the languages, at a very small expense. This society is also gradually forming a library, and various collections to assist in science and in art. There are likewise several subscription rooms for newspapers, especially a very good one at the Exchange.

There is a well-endowed royal free grammar school, in which Greek and Latin were intended to be taught gratuitously; but a small fee is now paid by the scholars. It has access to some exhibitions at Lincoln College, Oxford. In several other schools many boys and girls are taught on the Lancasterian and Madras plans, and most of the churches and chapels have schools connected with them.

The institutions for benevolent purposes are numerous, of which the most prominent are Jesus' Hospital, which provides for forty old persons; Blacket and Davison's Hos-

pital, for six poor widows of clergymen or merchants; Newcastle-upon-Tyne. Westgate Hospital, for aged freemen and widows; the Keelman's Hospital, formed by that class of persons for the relief of their destitute, and chiefly maintained by a duty of one farthing per chaldron on all coals exported from the river Tyne; and the hospitals of St Mary Magdalen and of the Virgin Mary.

The establishments for administering relief to the diseased or infirm poor are, the Infirmary, to which is now annexed a Lock Hospital, and which extends relief to the sick and lame poor of the counties of Newcastle, Durham, and Northumberland, the average annual number of in-patients being 800, and of out-patients 700; the Dispensary, founded in 1777, supported by voluntary contributions, the object being the administration of medical and surgical aid to all diseased applicants, and the promotion of vaccine inoculation; the House of Recovery, for the reception of persons afflicted with febrile diseases; the Lunatic Asylum, for thirty-eight males and the same number of females; the Lying-in-Hospital, for poor pregnant women; the Eye Infirmary; and St Luke's Hospital.

The markets are well supplied with provisions of all kinds, which are sold at very cheap rates; and the market for corn is one of the largest in the north of England. Water is abundantly supplied by the Water Company, from resources and reservoirs in Gateshead. There are no less than twelve public fountains, here called *pants*, in different parts of the town. These are ready to furnish water for the fire-engines, which are under good regulation. There are companies for insurance against fire, as well as for ship and life risks. The town is well watched, and lighted for the most part with gas.

The places of amusement are not numerous; the most prominent being the theatre denominated royal. The former house was opened in 1788, and was pulled down in 1836 to make way for the building of Grey Street. The new theatre, which is a structure of great beauty, was opened in February 1837. The assembly-rooms, built in 1766, are commodiously planned, having a ball-room ninety-four feet by thirty-six, with a music gallery; adjoining are card-rooms, a room for private assemblies, and on the lower story is a supper-room, in which 460 individuals have been accommodated at the same time. There is a music-hall appropriately fitted up, with the requisite auxiliary apartments. The Northern Academy of Arts is solely appropriated for the public exhibition of pictures, and for the purposes of a diorama. The first exhibition of paintings in Newcastle was opened in September 1822.

The communication between Newcastle and the western coast will be greatly facilitated by the Newcastle and Carlisle Railroad, which it is expected will be completed in 1838, and, with the Brandling Junction Railroad, will connect the towns of South Shields, Monk-Wearmouth, Bishop-Wearmouth, and Sunderland, and increase the trade very considerably. The Newcastle and Carlisle Railroad, in its present unfinished state (thirteen miles in the centre not being completed), yields a revenue of L.50,000 a year; and, when completed, it is estimated to produce an annual income of L.100,000. The length of this railway, including the Brandling Junction, will be sixty-five miles from sea to sea.

NEWEL, a circle of the Russian province Witepsk, extending in north latitude from 55. 45. to 56. 20., and in east longitude from 28. 54. to 30. 21. It contains four towns, and 1872 hamlets or farms, in eighteen Greek and twelve united parishes, having a population of 69,430 inhabitants. The capital is a town of the same name, 388 miles from St Petersburg, on the lake Newelskoi, at the mouth of the river Emerka. It contains three churches, 434 houses, and 2860 inhabitants. Long. 29. 30. E. Lat. 55. 58. N.

New
England.

NEW ENGLAND, the name of the northern states of the North American union, namely, Maine, Vermont, New Hampshire, Massachusetts, Rhode Island, and Connecticut. The physical characteristics, and the social and commercial relations, of these states, will be found described each under its individual head. But the history of the several states has not yet been given, because, since an account of one state involves to a considerable extent that of another, it was considered as most judicious to give a narration of the whole transactions which have taken place in this part of the American union under one head. In 1606, the portion of North America lying between the thirty-fourth and forty-fifth degrees of latitude was divided into two parts, called North and South Virginia, and granted to two companies. The London Company were allowed to make settlements anywhere between 34° and 41°, and the Plymouth Company received the same privilege in regard to the country between 38° and 45°. Previously to the survey of the coasts by Captain Smith, in 1614, the country went by the name of North Virginia; but in 1660 Prince Charles changed it to that which it now bears, at the same time granting a patent to the Plymouth Company, comprehending that part of the country which lies between 40° and 48° from north to south, and extending throughout the mainland from sea to sea. The name of New England has, ever since the landing of the first settlers at Plymouth, Massachusetts, in December 1620, continued to designate the country lying east of New York; and although it has never, properly speaking, formed a political whole, it possessed from the first, and still possesses, certain characteristics which distinguish it from the rest of the Union. Most of the colonies planted in New England were founded on the same principles of government, by men closely associated with each other from similarity of political and religious views. Before landing, they signed a solemn covenant, forming themselves into a body politic for the purpose of making laws for the general good. The governments which were erected in these colonies were chartered governments, the ownership and administration of affairs being vested in the colonists, whilst the governments of the other colonies were royal or proprietary, civil authority and property being vested, the one in the crown, and the other in the colonists. The New England settlers were republicans before their arrival in North America, and being afterwards joined by those who fled thither as to a city of refuge during the civil commotions in the mother country, and also after the Restoration, the body became very numerous, and they may be said to have adhered to their principles ever since. The early and general provision for common education in New England was another peculiarity of that part of the country. Laws were soon passed commanding the establishment of schools in every town, and these enactments laid the foundation of the New England system of free schools. The organization of the church government is entirely democratical, and the municipal system is in many respects peculiar.

In consequence of the representations made by Martin Pring, an English navigator, who explored part of the shore of New England in 1603 and 1606, a settlement was attempted to be formed at the mouth of the Kennebec, in the state of Maine. But accidental circumstances frustrated this design, and it was not until 1622, when Sir Ferdinando Georges, conjointly with one Mason, obtained a grant of the territory lying between the rivers Merrimac and Kennebec, that such measures were taken as secured a permanent settlement in this part of the country, which commenced the year following at the mouth of the Pascataqua. Several patents of inferior extent were subsequently issued, one of which conveyed the Pemaquid tract of country, now Bristol, which is regarded as the oldest permanent settlement in Maine. In

1635 the council conveyed to Georges a separate title to the portion of the former grant east of the Pascataqua, having previously confirmed in the possession of the western part Mason, from whom it received the name of New Hampshire. Georges obtained for himself, by royal charter, the powers of lord palatine, as exercised by the Bishop of Durham; appointed a board of counsellors; and in 1640 assembled a court, at which the inhabitants of the several plantations appeared, and renewed their oath of allegiance to the lord proprietor. Sir Ferdinando, who was a royalist, had his share of the disasters with which the adherents of Charles I. were overwhelmed; and dying in 1645, he left his estate to his son John Georges. During the civil commotions which confounded alike titles and property, one Colonel Rigby laid claim to forty square miles of the best part of Georges' inheritance, which claim was recognised in 1646; and the small remaining portion of Maine, having elected a governor, petitioned parliament in 1650 to constitute them a distinct jurisdiction, "a part of the commonwealth of England," but without success. Their apprehensions of falling into the hands of the Puritans were soon realized. In the year 1652, nearly the whole of Maine was claimed by the colony of Massachusetts Bay, under the pretext that it was embraced in their charter; and they succeeded for a time in exercising supreme control over it. In 1665, after the restoration of Charles II., commissioners were appointed to visit Maine, who declared the province to be under the protection and government of the king, and nominated a magistracy. No sooner had they quitted the country, however, than the authorities of Massachusetts resumed their sway, and the inhabitants were compelled to yield an unwilling submission. But Georges, the legal proprietor, at length succeeded in obtaining a restitution of his title, and the authorities of Massachusetts Bay were summoned to appear at Whitehall. Determined to retain possession of the country, they instructed their agents to make a purchase of it should the decision go against them, which happening to be the case, Georges disposed of his title to the province for L.1250. This transaction took place in 1677-78. Immediately after purchasing Maine, the council of Massachusetts proceeded to organize a provincial jurisdiction, constituting it a county under the name of York; an arrangement which lasted, without any change, till 1760, when the counties of Cumberland and Lincoln were incorporated, and the county of York was reduced to nearly its present limits. After the independence of the colonies was established, Maine was styled a district, although its connection with Massachusetts remained the same until it was erected into an independent state in the year 1820. See the article MAINE.

Plymouth, the next colony, was founded by a body of Puritans, who had removed from England to avoid religious persecution, and landed at a place in the new world, to which, in 1620, they gave the name of Plymouth. They entered into a voluntary compact, by which they bound themselves to observe certain laws and ordinances which should be framed and issued to promote the general good of the colony. This is the earliest American constitution, and is dated the 11th of November 1620, and signed by forty-one persons. The government was administered by a governor, chosen annually by the people, and by seven persons called assistants, elected in the same way. It was at first a pure democracy, but in the year 1639 a house of representatives was established. The political affairs of this colony are closely interwoven with those of Massachusetts, with which it was incorporated in 1772.

The colony of Massachusetts Bay, which has acted so conspicuous a part in the affairs of New England, originated in a number of individuals having, in 1628, obtained from the Plymouth Company a grant of that part of New England lying three miles south of Charles River,

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and the same distance north of the Merrimac, and extending from the Atlantic to the South Sea. In the following year they obtained from Charles I. powers as the company of Massachusetts Bay, being authorized to elect a governor and eighteen assistants annually, to hold courts, and to make laws and regulations for the colony. Settlements were immediately formed at Salem, Charleston, Boston, and other places, and the settlers soon obtained permission to transfer the charter and government to New England, thus rendering that the constitution of a state which was merely designed to constitute the organization of a company. In 1634 the people claimed a participation in the government, and declared that the general court (the name which the two houses of legislature in Massachusetts still bear) alone had power to frame laws, levy taxes, and fill up offices. This, therefore, became a fundamental part of the constitution; but disputes arising between the assistants and the deputies of the people, who met in the same room, it was determined, in 1644, that the legislature should consist of two separate bodies, each having a negative on the other. No judicial authority was given by the charter, but the power was in fact assumed and acted upon. Courts of justice were created, and in criminal cases the Mosaic law was mainly followed.

Connecticut was an offshoot from Massachusetts, and at first was governed by magistrates empowered by the legislature of the parent colony. But in 1639 they framed a constitution for themselves, the substance of which was contained in the charter granted by Charles II. in 1662, and continued, without any material alteration, to be the fundamental law of the state until 1818. New Haven, which was settled in 1637 by a body of Puritans, continued to exercise powers of government as a separate body until 1662, when the colony was by charter included in Connecticut.

In the year 1634, a minister of the name of Williams having been banished from Massachusetts on account of his religious creed, settled at Providence, whither he was followed by a few adherents. Four years afterwards, a lady, banished from the same place for the same reason, purchased Rhode Island from the Indians; and thus two new communities, with distinct governments, were formed. In 1643, commissioners of plantations had been created; and from these a charter of incorporation was obtained for the inhabitants of the towns of Newport, Portsmouth, and Providence, under the designation of the Providence Plantations, with full powers to adopt a form of government, and to rule themselves. In the same year in which the commission was appointed, the colonies of Massachusetts, New Plymouth, Connecticut, and New Haven, formed a confederacy, under the title of the United Colonies of New England, which lasted about forty years, when James II. deprived them of their charters. This confederation was exactly the future union of states in miniature. According to the articles of the confederacy, the colonies bound themselves by a perpetual league of friendship and amity for offence and defence, whilst individually they managed their own affairs. Two commissioners of each of the confederates formed a board for transacting the affairs of the confederacy generally. This was just congress in embryo. During the ascendancy of Cromwell the New England colonies were highly favoured; but the restoration of royalty subjected them to suspicion, and, as we have seen, to scrutiny. In the year 1664, royal commissioners were appointed to visit them, and hear and decide all their complaints, and appeals, civil, criminal, and military, thus bringing the whole under the immediate superintendence of the crown. But, as Lord Clarendon expressed it, the colonies were already hardened into republics, and the commissioners found it impossible to execute their powers. Arbitrary measures were resorted to, to bring the refractory provinces under

proper control, but without effect; so that, by the year 1687, it had been declared that they had forfeited their charters and their liberties, which were accordingly seized by the crown. Sir Edmund Andros, the governor, put himself at the head of a body of troops, and advanced to Connecticut for the purpose of seizing the charter. The assembly was convened, and the charter was conveyed to the room, where they met to confer with Andros. The conference was prolonged till night, when the people without made a rush into the room, extinguished the lights, and secreted the charter in an oak, which is still shown at Hartford. In many places the inhabitants refused to pay taxes, and a rumour having been circulated that the Prince of Orange had landed in England, the people of Boston rushed to arms, seized the governor, and the captain of a frigate which lay in the harbour, compelled the castle to surrender, and thus effected a complete revolution. Subsequently to these events, Connecticut and Rhode Island resumed their former charters; but, in 1672, a new one was granted to Massachusetts, by which the appointment of the governor was vested in the crown. It is superfluous to narrate the wars with the Indian tribes in which these colonies were involved, or those in which Britain finally annihilated the power of France in America. An account of these belongs more to the general history of the United States than to the present sketch. Vermont, the only New England state which remains to be mentioned, took no lead in these transactions; and any event of importance in which it was concerned will be found related in the article **NEW YORK.** (R. R. R.)

NEWENT, a market-town of the county of Gloucester, in the hundred of Botloe, 108 miles from London. It is a small town, and what little trade it enjoys arises from its market on Friday, and from the canal from Gloucester to Ledbury, which passes near to it. The inhabitants amounted in 1801 to 2354, in 1811 to 2538, in 1821 to 2660, and in 1831 to 2859.

NEW FOREST of Hampshire, in England, is a tract of at least forty miles in compass, which had many populous town and villages, and thirty-six mother churches, until it was destroyed and turned into a forest by William the Conqueror. As this large tract lay many ages exposed to invasions from foreigners, Henry VIII. built some castles in it. It is situated in that part of Hampshire which is bounded on the east by Southampton River, and on the south by the British Channel. It possesses advantages of situation, with respect to the convenience of water carriage and nearness to the dock-yards, superior to every other forest, having in its neighbourhood several ports and places of shelter for shipping timber, amongst which Lyminster is at the distance of only two miles, Bewley about half a mile, and Redbridge three or four miles from the forest; and the navigation to Portsmouth, the most considerable dock-yard in the kingdom, is only about thirty miles from the nearest of these places. This is the only forest belonging to the crown of which the origin is known. Domesday-book contains the most distinct account of its afforestation by William the Conqueror. The contents of every field, farm, or estate, afforested, in hides, carucates, or virgates, by which the extent of land was then computed, together with the names of the hundreds and villages, and of the former proprietors, which are for the most part Saxon; the rent or yearly value of each possession, and the tax which had been paid for it to the crown during the reign of Edward the Confessor, before the inhabitants were expelled, and that part of the country laid waste; are all to be found in that curious and venerable record. Wishing to discover the original extent of the forest, we had extracted all that relates to it in that ancient survey; but the extract is far too voluminous for insertion. The names of many of the places having since that time

Newfound-land. been changed, it is difficult to ascertain with precision what were then the limits of the forest. The oldest perambulation we have met with is amongst the Pleas of the Forest, in the eighth year of Edward I. preserved in the chapter-house at Westminster. The boundaries there described include all the country from Southampton River on the east to the Avon on the west, following the sea-coast as far as the southern boundary between these rivers, and extending northwards as far as North Chadeford, or North Charford, on the west, and to Wade and Owerbridge on the east; and the greater part, if not the whole, of that extensive district, is mentioned in Doomsday-book as the forest belonging to the crown. Another perambulation was however made in the twenty-ninth of the same king, and leaves out a great part of the country contained in the former. This perambulation, which is preserved in the Tower of London, confines the forest to limits which, as far as can be traced, appear to have been followed in the twenty-second year of Charles II. when the forest was again perambulated. By the *Charta de Foresta*, all lands not belonging to the crown which had been afforested by Henry II. Richard I. or King John, were to be disafforested; but as no provision was made for the reduction of the more ancient afforestations, it is easy to account for the great diminution of this forest in the reign of Edward I. who was not a prince likely to submit to any encroachment on his rights. The perambulation of the twenty-second of Charles II. is the last which is found upon record, and contains the actual legal bounds of the forest. According to the perambulation last mentioned, and the plan founded thereon, the forest extends from Godshill on the north-west to the sea on the south-east, about twenty miles, and from Hardley on the east to Ringwood on the west, about fifteen miles, and contains within those limits about 92,365 acres statute measure. The whole of that quantity, however, was not forest land, nor is it now the property of the crown. There are several manors and other considerable freehold estates within the perambulation, belonging to individuals, to the amount of about 24,797 acres; about 625 acres are copyhold or customary lands belonging to his majesty's manor of Lyndhurst; about 1004 acres are lease-hold under the crown, granted for certain terms of years, and forming part of the demised land revenue, under the management of the surveyor-general of crown lands; about 901 acres are purprestures or encroachments on the forest; about 1193 acres more are enclosed lands held by the master-keepers and groom-keepers, with their respective lodges; and the remainder, being about 63,845 acres, consists of woods and waste lands of the forest. To perpetuate the spot where William Rufus was killed by the glance of an arrow shot at a stag, a triangular stone was erected in 1745.

NEWFOUNDLAND, an island in the North Atlantic Ocean, lying on the north-eastern side of the Gulf of St Lawrence, between the parallels of 46. 40. and 51. 31. north latitude, and the meridians of 52. 44. and 59. 31. longitude west of Greenwich. It is separated on the north-west from Canada by the Gulf of St Lawrence; on the north and north-east it is divided from the coast of Labrador by the strait of Belleisle, which is about fifty miles long by twelve broad; on the south-west it approaches Cape Breton, so as to form the main entrance from the Atlantic Ocean into the gulf; and along the whole of its eastern side extends the Atlantic Ocean. Its form is somewhat triangular, but without any approach to regularity, being on all sides, at very short intervals, indented by broad and deep bays, creeks, harbours, caves, and estuaries. In this respect its shores resemble those of Nova Scotia, and the serrated appearance which they have on maps is attributable to the same cause. A vast and uninterrupted body of water impelled by the trade-wind from

the coast of Africa to the American continent strikes this part of it with tremendous violence, and working away the softer strata, forms those numerous arms and inlets of the sea which we have mentioned. The same powerful agent, combined with the influence of the Atlantic Ocean, has produced the same effect upon other parts of the coast besides those exposed to its first attack. The coast outline, the only part of Newfoundland which has been satisfactorily explored, is rock, girt all round with abrupt fissures, and having some lofty headlands on the south-west side. Its width, at the broadest part, between Cape Ray and Cape Bonavista, is about 300 miles; its extreme length, measured on a curve from Cape Race to Griquet Bay, is about 419 miles; and, exclusively of the bendings and inferior inflections of the coast, its circumference may be estimated at about 1000 miles, the whole comprehending an area of 36,000 square miles.

This vast island reposes upon an immense bank, a succession of which has been observed all the way to Nova Scotia. It is apparently a mass of solid rock, having a very wild and rugged appearance from the sea, and being any thing but inviting. On its south-eastern quarter Newfoundland is formed into a peninsula of twenty-six leagues in length by from five to twenty leagues in breadth, the isthmus which unites it with the main land being not more than four miles in breadth. This peninsula is called Avalon. To the north of it, and on the eastern side of the island, lies Trinity Bay, which is separated from that of Bonavista by a narrow neck of land, the point of which is Cape Bonavista. A long neck of land also divides Trinity Bay from Conception Bay on the northern side of Avalon. This bay ranks as the first district in Newfoundland, as well on account of the spirit and enterprise of the inhabitants who people its shores, as from its natural advantages of large harbours, coves, and the like. The scenery on this part of the coast is majestic, wild, and calculated to strike the beholder with awe. On the eastern side of Conception Bay are several islands, one of which is Bell Isle, so called from the shape of a remarkable rock close to its western side. This island is about six miles in length, and extremely fertile. Seven leagues distant from Cape St Francis, the eastern boundary of Conception, are the bay and harbour of St John's, the capital of Newfoundland. A succession of bays indent the coast all round the peninsula of Avalon, the principal of which are, Trepassey Bay, which has a large secure harbour and excellent anchorage, with a considerable fishery carried on in the coves and creeks; and Placentia Bay, which is about sixty miles deep and forty-five broad, lying between Cape St Mary and Cape Rouge, which are fifteen leagues apart. It is very spacious, with several rugged islands near its head. The port and town of Placentia lie on the eastern side, as well as the chief harbour, which, although it can only be entered by one vessel at a time, affords anchorage for one hundred and fifty. Placentia Bay contains several other harbours. It is separated from Fortune Bay by one of those long and narrow necks of land which are so common in the island. Fortune Bay is from sixty to seventy miles deep, and from twenty to thirty miles broad, receiving many rivers from the island lakes, and containing numerous harbours, the principal of which is Fortune Harbour on the eastern side. St Pierre and Miquelon Islets are situated at the mouth of Fortune Bay. They were ceded to France in the year 1814, and the former contains a harbour which is the rendezvous of the French shipping, and the residence of the governor. From this point, all along the south side of Newfoundland to Cape Ray, which forms the north-east entrance of the Gulf of St Lawrence, there are numerous bays, but none of sufficient size or importance to require particular description. On the western side, formed by Cape Anguille and Cape St George, is the Bay of St

Newfound-land. George, a large and deep inlet of the sea, into which several rivers emerging from lakes in the interior empty themselves. Further to the north is the Bay of Islands, formed by three arms, through which several rivers discharge their waters. One of these, called the Humber, is the most considerable yet discovered, its course having been traced for one hundred and fourteen miles to the north-westward, where it issues from a cape of ten leagues in length. As its name would indicate, this bay contains a number of islands, but none of any particular consequence. The next large indentation of the sea on the western side of Newfoundland is Bonne Bay, which has also rivers communicating with the lakes inland to Point Rich. The next bay is called Ingornachoix Bay, which contains two harbours; and to the north of it is St John's Bay, which receives the waters of Castor's River. Along the straits of Belleisle, which separate Newfoundland from the coast of Labrador, are a few inconsiderable inlets; but beyond Cape Norman, the north-west point of the island, is a large bay called Pistolet Bay, bounded by Cape Barut. On the northern extremity of Newfoundland are Griquet Bay and Hare Bay, a deep gulf, the bottom of which intersects the island for two thirds of its breadth at this point, branching off into innumerable bays and coves, sheltered by lofty hills. From this haven to White Bay, a very large inlet of the sea, on the eastern side of the island, and thence to Cape St John, the coast is indented at short distances by commodious and much-frequented harbours. The Bay of Notre Dame and the Bay of Exploits are of great extent, and contain a vast number of islands, together with a thriving settlement called Twilingate. The river Exploits is about seventy miles long, but its navigation is obstructed by rapids, some of which have a velocity of nearly ten miles an hour. This river connects the Red Indian Lake, a large sheet of water in the interior, with the Atlantic. Gander Bay is much of the same description; and all have important salmon fisheries. From Cape St John to Cape Freels the coast is a continuation of ledges, shallows, islands, and rocks, but affords excellent fishing grounds. Bonavista Bay contains several islands, and is itself indented by a number of small inlets and harbours. To the south of it is Catalina Bay, containing Ragged Harbour, which concludes the circuit of the island.

After the exterior aspect of Newfoundland has been described, the interior comes naturally to be noticed. But this has been very imperfectly explored, and therefore is but little known. In 1823, a Mr M'Cormack succeeded in traversing its breadth from Conception Bay on the east to St George's Bay on the west; and from his account it appears, that this portion of it at least is much intersected with lakes and rivers, but poorly wooded, and of a rocky and barren soil. In this respect the island differs greatly from the other North American colonies, producing little timber but what is dwarf and stunted, except on the margins of bays and rivers, where spruce, birch, and poplar sometimes grow to a considerable size. Several high hills, supposed to be situated near the centre of the island, can be discerned from the sea; but the inland country is represented as generally level, so that lakes, rocks, marshes, and extensive alluvial savannahs or plains, with occasional elevations, constitute its characteristic features. The geology of Newfoundland is nearly the same as that of the coast of Labrador. The island, it appears, abounds with minerals of various sorts. Coal and lime have been wrought in more than one part with some success; and there is little doubt as to the existence of copper, iron, and other mines, but it is not likely that they are very productive. There are excellent gypsum quarries near Cape Ray, and there is also a quantity of the mineral called marcasite,

Newfound-land. copperas stone, and horse gold, which the early discoverers mistook for the genuine metal. With regard to the productions of the island, Mr Bouchette observes:¹ "At the heads of the bays, and along the rivers, there are many tracts of land formed of deposits washed from the hills; the soil of which tracts is of much the same quality as that of the savannahs in the interior of America. These lands might be converted into excellent meadows, and if drained to carry off the water which covers them after the snows dissolve, they would yield excellent barley and oats. The rich pasturage which the island affords adapts it in an eminent degree to the breeding and raising of cattle and sheep, insomuch as to authorize the belief that it might produce a sufficient quantity of beef to supply its fisheries. Firs of various sorts, poplars, birches, and a few maple trees, are found in Newfoundland, with a variety of shrubs. Most of the English common fruits arrive at perfection, and various grasses grow spontaneously in all the plains. The wild animals are nearly the same as those of Prince Edward Island, and indeed of our other American colonies. The Newfoundland dog is an animal whose peculiarities and virtues are too well known to need any detail in this place; it is, however, generally considered that the true original breed exists now only on the coast of Labrador.

"The climate is severe, and the winter long; but it has generally been represented more unfavourable than strict truth will warrant. The excess of humidity and constant visitation of dense fogs, which have been commonly ascribed to these coasts, is by no means a continual visitation. The sea-winds often bring a considerable quantity of vapour to the southern and eastern coasts; but it is only when the wind blows from the sea that this inconvenience is felt. The range of the thermometer is nearly the same as in Canada, but as the length of the island extends over nearly five degrees of latitude, it will of course vary. The harbours on the Atlantic shore are generally freed from their icy bonds earlier than any other within the Gulf of St Lawrence, and the western shore is seldom visited by fogs. The heat of the summer is sometimes oppressive in the day-time, but the mornings and evenings, as in almost all insular situations, are temperate and agreeable. The breaking up of the winter, when the vast shoals of ice formed in the northern regions are driven along the coast by the winds, is the most disagreeable time of the year. The inhabitants, however, maintain excellent health, and, notwithstanding the exposure and hardships of a fisherman's life, frequently attain a remarkable longevity."

The most remarkable feature connected with Newfoundland is the fogs above alluded to. Those of the Gulf of St Lawrence are attributed to the coldness of the gulf-waters, which is supposed to be permanent a few feet below the surface, as well as at great depths. This cold water is brought to the surface by winds, and, reducing the temperature of the air below the dew point, forms vapour. The fogs on the banks of Newfoundland are also, in all likelihood, caused by cold currents of water being brought to the surface. On the great bank the surface of the water is many degrees colder than it is in the neighbouring sea, and much less than that of the gulf-stream, which is within a short distance of it.

The most valuable vegetable productions of the island are potatoes and cabbages; and next to these turnips, carrots, parsnips, pease, radishes, and most garden roots, yield the most abundant crops. Besides the great staple of the island, fish, the numerous large and small sheets of water abound in divers kinds of excellent trout and eels of a great size, and lobsters, lance, herrings, mackerel, salmon, are in great abundance; plaice, sole, halibut, and thornback, are

¹ Bouchette's British Dominions in North America, vol. ii. pp. 187, 188.

Newfound-land. likewise found on the coast. The capelin arrives periodically in such immense shoals as to change the colour of the sea. Herrings likewise arrive during spring and autumn in prodigious numbers. As a product of the coast may be mentioned kelp, which, with other sea-weed, is used as manure.

The importance of this colony has exclusively arisen from its fisheries. The different settlements amount to between sixty and seventy in number, and are scattered on the shores of the eastern and southern sides of the island, but principally on the former. There are, indeed, some inhabitants on the western shore, near its southern extremity; but they do not extend to the northward of St George's Bay, although the vicinity of that bay has proved extremely fertile. The settlements are generally formed at the heads of the bays, particularly Conception Bay, thence to St John's, and southward to Cape Race. The principal are, besides St John's, the Bay of Bulls, Brigus, Cape Broyle Harbour, Ferryland, Fermoyle, and Renowes. St John's, the capital of the island, is a place of considerable strength, situated about seventy miles to the north of Cape Race, and about one hundred and twenty south of Twillingate Island in the Bay of Exploits, which is the most northerly settlement, latitude 47. 35. north, longitude 52. 48. west. The harbour is one of the best in Newfoundland, being formed between two mountains, the eastern points of which leave an entrance, called the Narrows. This is the only assailable part, but it is so well defended, that any vessel attempting to force an entrance would inevitably be destroyed. There are about twelve fathoms of water in the middle of the channel, with tolerably good anchorage ground. The most lofty perpendicular precipices rise to an amazing height upon the north side, and the southern shore appears less striking in its altitude, only from a comparison with the opposite rocks. There is a light shown every night on the left side of the entrance, where there are also a small battery and a signal-post. Other batteries of greater strength appear towering above the rocky eminences towards the north. At about two thirds of the distance between the entrance and what may properly be termed the harbour itself, there is a dangerous shelf called the Pancake, opposite the chain rock, so called from a chain which extends across the strait at that place, to prevent the admission of any hostile fleet. There are other fortifications besides those already noticed, planted upon the heights around the town, so as to render St John's perfectly secure against any sudden attack. Fort Townshend is situated immediately over the town, and is the usual residence of the governor. Forts Amherst and William are more to the north; and there is also a small battery perched on the top of a single pyramidal mount, called the Crow's Nest. The town itself forms one long straggling street, extending nearly parallel to the shore on the north side of the port, from which branch out several narrow lines of houses, that can only be called lanes. The houses are chiefly built of wood, although diversified by some of brick and a few of stone; but they are most irregularly placed, in consequence of an act of the British legislature, passed in 1820, after the great fires, which directs, that where the houses are built of stone, the street shall be forty feet in width, and where of wood, fifty; so that all the stone houses project ten feet into the street. The principal feature of the town consists in its multitude of wharfs and fishing stages, which entirely line the shore. The government wharf is a fine broad quay, open to the accommodation of the public. The roadway of the main street is very rugged and irregular, and the general appearance of the town indicates exactly what it is, viz. a fishing station. St John's has repeatedly and severely suffered from fires. In 1815, a great amount of property was destroyed by a visitation of this sort, which was repeated in November 1817, with

increased severity, property to the amount of L.500,000 Newfound-land. having been destroyed. Within a few days afterwards, another conflagration consumed nearly all of the town that had been left by the former one; and in August of the same year a fourth calamity nearly completed its destruction. There are places of public worship of various denominations at St John's, two school-houses, and a book society; and five newspapers are also published. The population of the town is constantly fluctuating. At the height of the fishing season it is perfectly crowded, but the greater part of these are strangers, who return with their vessels to Europe. The resident population may be estimated at 11,000. The society of this town has for some years rapidly advanced in respectability and civilization; partly on account of several merchants deeply engaged in trade having settled here, and many of the industrious inhabitants having raised themselves to comparative opulence; and partly owing to the administration of justice having been placed upon a more permanent footing than formerly. The settlements extend almost continuously along the southern shore, as far as Fortune Bay; and at most of the harbours there are places of public worship. The establishment at St George's Bay is perhaps more agricultural than any other on the island; but Conception Bay, being the most populous, requires more particular notice. "Harbour Grace is a good port," says Captain Robinson; "and the town is considerable, and of a respectable appearance. Conception Bay, in which it is situate, is the richest and most populous country district in Newfoundland, containing altogether about 23,215 inhabitants, a large proportion of the 74,705 which the most recent census (1836) gave for the whole population of the island. They are distributed in a number of small towns, or fishing and agricultural hamlets; near another of which, Port Grace, a remarkable basin is hollowed out in the cliffs by the action of frost, or the more certain operation of time, in the decaying slate clay of which the rocks are composed. First an arch is entered twenty feet wide by twenty feet high, and beyond is the basin itself, which is about 300 feet in circumference, and surrounded by perpendicular rocks 120 feet in height, with a border of dwarf spruce at top. At one corner, a little exit among broken masses of rock carries off the superfluous water; the depth near the centre of the cavity is about fourteen feet." On leaving the harbour, the same writer observes: "The harbour is good; and though the space between the end of the bar and the north shore is rather narrow, a large ship, well handled, may beat through, or back and fill in and out, with the tide."

Near the extremity of Port Grace Harbour are the remains of a supposed ancient colony, which some have attributed to the Danes or Icelanders; a sea-king of the latter people having, according to tradition, been driven by stress of weather upon this part of the coast about the year 1000. The ruins were discovered by a party of settlers, who, proceeding up a river which falls into Conception Bay, observed, at the distance of six or seven miles above the bay, the appearance of stone walls rising just above the surface. "On removing the sand and alluvial earth, they ascertained these to be the remains of ancient buildings, with oak beams, and mill-stones sunk in oaken beds. Enclosures resembling gardens were also traced out, and plants of various kinds were found growing about the place, not indigenous to the island; but the most decisive proof of these ruins being the remains of an ancient European colony, was drawn from the different kinds of coins found about them, some of Dutch gold, which the inhabitants considered to be old Flemish coins; others of copper without inscriptions." Captain Robinson, however, throws doubt on the antiquity of the buildings, and asserts that they are not older than the settlement of Lord Baltimore in 1623.

Newfoundland is justly considered as a very important

Newfound-land. colony, both from the value of the fisheries there established, and also on account of the hardy race of seamen who are trained up in that useful pursuit. In the article FISHERIES in this work will be found an account of the early trade of the colony, so that, in order to show its present condition, it may be sufficient to give the returns applicable to a recent period. The following table shows the progress of trade since 1822. Newfound-land.

Years.	Inwards from								Outwards to							
	Great Britain.		British Colonies.		Foreign States.		Total.		Great Britain.		British Colonies.		Foreign States.		Total.	
	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.
1822	297	38,167	274	20,818	178	22,037	749	81,022	146	17,457	281	24,299	321	38,859	748	80,615
1823	289	39,813	254	21,015	201	23,650	753	84,478	116	12,238	272	25,725	353	42,569	741	80,532
1826	279	35,196	295	24,594	277	33,316	851	93,406	171	19,770	326	30,557	328	40,223	825	90,550
1827	279	37,595	268	22,417	239	30,368	786	90,380	164	20,182	311	33,114	291	35,667	776	88,963
1829	275	38,608	319	17,507	197	24,915	791	91,030	147	17,766	350	36,544	278	34,883	775	89,193
1830	286	39,856	321	26,363	221	28,204	828	94,423	158	19,054	357	37,610	284	35,718	799	92,382
1831	274	37,577	385	30,643	218	20,349	877	96,569	181	21,764	432	43,159	223	27,575	836	92,498
1832	268	36,265	362	27,881	215	25,783	845	89,929	167	20,221	430	39,113	199	25,111	796	84,445
1833	251	35,171	419	33,287	222	26,784	892	95,242	151	18,515	450	42,327	244	30,118	845	90,960

A more detailed view of the shipping employed with different countries is thus shown by custom-house returns.

	Year ending 5th January 1833.						Year ending 5th January 1832.					
	Inwards.			Outwards.			Inwards.			Outwards.		
	No.	Tons.	Men.	No.	Tons.	Men.	No.	Tons.	Men.	No.	Tons.	Men.
United kingdom.....	245	34,322	1969	150	18,280	1110	257	34,704	2024	164	19,728	1203
Guernsey and Jersey.....	6	849	53	1	235	12	11	1,561	103	3	493	33
British West Indies.....	54	5,490	356	73	7,796	503	54	5,605	379	71	7,821	515
British North America.....	363	27,522	1535	371	33,748	1867	308	22,276	1158	355	30,871	1595
Foreign } British vessels....	132	16,276	1017	183	22,137	1413	159	19,995	1413	173	21,500	1333
Europe } Foreign vessels....	5	565	40	...	...	...	...	...	...	2	336	14
United } British vessels.....	68	7,938	451	29	3,515	206	50	5,146	279	21	2,330	137
States } Foreign vessels....	5	849	42	...	...	...	3	409	14	1	73	4
Madeira.....	...	...	...	...	...	...	2	163	10	1	102	6
Azores.....	5	458	27	6	458	26	1	70	5	1	70	4
Brazils.....	2	415	23	23	3,896	225	...	...	...	...	...	...
Gibraltar.....	2	275	14	6	789	44	...	...	...	4	421	26
St Pierre.....	3	112	12	3	112	12	...	...	...	...	...	...
Porto Rico.....	2	171	13	...	...	...	...	...	...	...	...	...
Total.....	892	95,242	5552	845	90,966	5418	845	89,929	5385	796	83,745	4870

The following table presents a view of the principal exports from Newfoundland.

	1830.	1831.	1832.	1833.
Dry cod fish.....quintals	948,463	755,667	654,053	663,787
Seals' skins...No. of casks	300,682	559,342	682,803	501,436
Cod and seal oil.....tons	8,306	12,371	13,118	10,539
Staves.....number	25,204	32,568	29,000	40,679
Salmon.....casks	4,439	3,606	2,924	2,705
Herrings.....barrels	1,083	1,799	1,064	3,969
Mackerel.....do.	390	456	984	606
Tongues, sounds, and caplins.... } casks	1,759	2,092	1,646	819

Besides these articles, various kinds of skins are exported, and also whalebone, pine-board, juniper plank, billets, knees, oars, staves, and the like; but the above returns show that the cod and seal fisheries are by far the most important branches of the trade of Newfoundland.

For an account of the nature of the Newfoundland fisheries, and their importance to Great Britain, the reader is referred to the article FISHERIES.

The principal imports consist of bread, flour, pork, and beef, butter, rum, molasses, wine, brandy, and gin, coffee, tea, sugar, oatmeal, salt, pease and beans, lumber, shingles, and the like. The value, together with that of the exports, has been as follows.

Imports valued in Sterling Money.					Exports valued in Sterling Money.			
Years.	From Great Britain.	From British Colonies.	From Foreign States.	Total Value of Imports.	To Great Britain.	To British Colonies.	To Foreign States.	Total Value of Exports.
	L.	L.	L.	L.	L.	L.	L.	L.
1822	656,327	177,423	34,002	867,752	245,578	82,952	400,668	729,198
1826	204,753	131,090	179,600	512,443	293,745	121,746	343,814	759,305
1827	549,816	157,731	181,714	889,261	316,596	116,513	331,477	764,586
1830	546,839	130,286	91,291	768,416	252,389	140,520	292,771	685,680
1831	530,954	177,958	102,441	829,353	393,584	132,258	277,690	803,532

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The total value of the Newfoundland trade may be estimated, in round numbers, at L.2,000,000 sterling per annum, independently of its great importance in a maritime point of view. But besides the trade in fish and oil carried on by Great Britain in the British seas, that of America and France is also of immense extent and importance. To France it averages about 300,000 quintals of fish, and not only are bounties given for this article, and for the vessel so much per ton, but also for those men employed who have never before been at sea. No bounty whatever is paid by our government, so that our fishermen have to compete under the greatest disadvantages. But this is not all. In 1814, the French obtained a right to a large extent of the coast fishery, or rather the right which they had enjoyed previously to 1792 was then restored, and the islands of St Pierre and Miquelon were ceded to them, to serve as a shelter for the French fishermen. This privilege, which was conferred by treaty, they have rendered exclusive, and so late as 1833 drove some English vessels off the coast of Newfoundland, not allowing them to fish upon the shores of their own island. The Americans also take every possible advantage of the privileges granted by us as regards the latitude fixed, fishing close to the land during night; and they likewise injure their neighbours by throwing their offal into the sea. Of the entire quantity of cod-fish which they take, not less than 1,500,000 are reckoned as caught on our own shores. The regular trade of Britain, besides suffering from the causes mentioned, is seriously injured by the extensive smuggling which the foreign fishermen carry on. From 1815, when the French and American vessels were allowed the privilege of fishing in the British seas, till 1820, the tonnage of the British vessels employed in the trade fell off about one third. The deep-sea fishery, in particular, is now almost abandoned by the English to the Americans and French. Indeed every thing relating to British interests, in connection with the Newfoundland fisheries, appears to have been grossly mismanaged or neglected.

The affairs of the island are administered by a house of assembly, consisting of fifteen members chosen by the people, to which is added a legislative and executive council. The laws are in the English language, and are administered by circuit courts. There is no militia in the island, and the police force is small. The revenue is derived from custom-duties, amounting to about L.15,000 per annum, and licenses, L.1000. To meet the expenditure, a parliamentary grant of about L.10,000 was for several years given; but this was withdrawn in 1832, and since then the revenue has not covered the expenditure by about that amount, so that its restoration has been found necessary. The moral aspect of Newfoundland is rather encouraging. Considerable unanimity has usually existed amongst the different religious persuasions, consisting of Wesleyans, Roman Catholics, and Congregationalists; the dissenters being generally more numerous than the Episcopalians, over whom there is an archdeacon. The Catholic church is governed by a bishop. There are several newspapers published in the island, and of late years a taste for literature has been diffusing itself. There are between thirty and forty schools, as well for adults as for children. At St John's there is a commercial society, out of which a chamber of commerce is chosen annually, to watch over and promote the trade and fisheries. There are several benevolent societies and two benefit societies. The population of Newfoundland for several years was as follows:

	Males.	Females.	Total.
1827-28.....	34,617	23,471	58,088
1835-36.....	42,467	32,238	74,705

In the year 1836 the number of cultivated acres in the nine districts into which Newfoundland is divided, with the exception of Fogo, from which there was no return, amount-

ed to 11,062, producing 10,300 bushels of oats, 1,168,127 bushels of potatoes, and 6975 tons of hay. The live stock in the same year were, 1551 horses, 5835 horned cattle, and 3103 sheep.

Newfound-
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When Newfoundland was first visited, it was found to contain two distinct races of aborigines; the one termed Red Indians, and the other Esquimaux. Both are now almost extinct; the former, it is supposed, is entirely so, as deadly feuds were waged between them and the early settlers. Besides, the Mic-mac Indians, who were introduced into the island from Cape Breton and Nova Scotia, carried on with the Red Indians an exterminating war, which proved far more fatal to them than the hostilities of the Europeans. A female of this tribe was captured in 1818, and from her a vocabulary of their language was obtained.

Without dwelling upon the tradition which represents Newfoundland as having been settled at a very early period by one Biron, a sea-king or pirate of Iceland, we have authentic evidence of its re-discovery by John Cabot, on the 24th of June 1497. Sailing under the commission of Henry VII. in these seas, he descried a headland, which, as a lucky omen, he called Bonavista, a name which it still retains. It was at that time inhabited by native Indians, three of whom he brought home, clothed in skins, and speaking a language which no person understood. It was afterwards visited by navigators from France and Portugal, who reporting favourably of the abundance and excellency of its cod fishery, European fishermen were soon attracted to its coasts. In 1536 an English vessel attempted to winter upon the island, but the crew nearly perished from starvation. Not deterred by this failure, however, nor by that of a former attempt, Sir Humphrey Gilbert, in 1583, landed on the island with two hundred followers, and, under a patent of Queen Elizabeth, took quiet possession of the country. But too desirous of prosecuting his discoveries, his crews became disaffected, and having separated into two parties, one of them returned home. Most of those who followed him were lost in a gale of wind off the Sable Island, and the remainder perished, along with himself, on their voyage homewards. Subsequent attempts were made to explore and settle Newfoundland, but it was not until the year 1623 that the first colony was established under Sir George Calvert, afterwards Lord Baltimore. His son was made governor of the colony, which he named Avalon, and soon afterwards proceeding thither himself, it increased and flourished under his auspices. Ten years subsequently Charles I. issued a regulation for "governing of his majesty's subjects inhabiting in Newfoundland, or trafficking in bays," &c.; and about the same time Lord Falkland sent a colony from Ireland. Other individuals obtained grants of land; and about the year 1654, fifteen settlements, comprehending three hundred families, had been made on the island, notwithstanding the constant bickerings between the English and French, the latter having established a colony at Placentia. On the breaking out of the war after the accession of William III., these assumed a more serious character, and, after various recriminations, St John's was compelled to surrender to the French in 1696. The captors set fire to the fort and town, and destroyed most of the British settlements. To repair these losses, our government despatched a squadron; but the cowardice of one commander and the ignorance of another frustrated the design. The re-establishment of peace put an end to hostilities for the time; but they were resumed in 1702, during which year most of the French settlements were destroyed, and a great many fishing-boats were burned or captured. In the following year an expedition miscarried, and this circumstance encouraged the French to attempt the conquest of the whole island in 1705. For this purpose five hundred men were despatched from Canada; but being repulsed from Petty Harbour,

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a port within nine miles of St John's, they extended their ravages over the different settlements as far as Bonavista. In 1706 the French trade received a severe blow from an English commander, who, with only ten vessels, crippled the armed force on the station, and destroyed a number of the enemy's vessels in the harbours along the coast. These disasters, however, did not deter the French from attempting the permanent expulsion of the English. In the year 1708 they completely demolished the town of St John's; and shortly afterwards Carbonia, the only settlement of consequence remaining in our hands, was partially destroyed. From this time until the conclusion of the peace of Utrecht the French remained in quiet possession of Newfoundland; but by this treaty the island, with all the adjacent ones, was declared to belong to Great Britain, the French being only allowed the use of the two islets of St Pierre and Miquelon. The final conquest of all the American colonies extinguished any claims which the French might set forth to possession in these seas; and they were glad to receive back at the peace of 1763 the privilege above conferred. The revolutionary war in America occasioned fresh disputes as to the right of fishing upon the banks of Newfoundland. The New Englanders had hitherto enjoyed the right of taking fish, and on this being resisted, they retaliated, by refusing to supply the colony with many articles of provision upon which it depended. This reciprocal annoyance caused the subject to form one of the articles of the treaty of peace, signed at Paris in 1783, by which it was stipulated that the inhabitants of the United States should have liberty to take fish of every kind on such part of the coast of Newfoundland as British fishermen should use, but not to dry or cure their fish upon the island. The question of supplies from America was a long time agitated, but finally authorized by act of parliament in 1822, confining the transit of goods to British bottoms. Newfoundland has had a resident governor ever since the year 1728. Civil and judiciary courts were early established; and about the year 1750, a superior court was added. But for many years the imperfect administration of justice continued to be a subject of complaint amongst the colonists. Bills have been repeatedly passed for the purpose of placing matters upon a more satisfactory footing; and in 1832 a representative government was granted to Newfoundland, similar to that enjoyed by Nova Scotia. (R. R. R.)

NEW GALLOWAY, a small royal burgh of Scotland, in the centre of the stewartry of Kircudbright. It is pleasantly situated on the western bank of the Ken. The town is formed of a single street, stretching along the public road. The parish church is about half a mile from the town, on the north side. There is attached to the town-house a criminal and debtor's jail, surmounted by a steeple and town clock. Below the town a handsome stone bridge was erected over the river in 1822. The inhabitants are entirely supported by the retail trade arising from the demands of the population of the surrounding country. It was erected into a royal burgh in 1629. By the set or constitution which, in 1708, received the sanction of the convention of royal burghs, the town ought to be governed by a provost, two bailies, a treasurer, and fifteen councillors; but as the parliamentary constituency do not amount to that number, the council is never complete. It has no funds or property of any description, with the exception of customs and small dues, which do not amount to L.3 yearly. It returns a member to parliament along with Wigton, Stranraer, and Whithorn. The population amounts to about 500.

NEW HAMPSHIRE, one of the United States of North America, is bounded on the north by the mountainous ridges which separate Canada from the states of the union, on the east and south-east by Maine and the Atlan-

tic Ocean, on the south by Massachusetts, and on the west by Vermont. It is situated between 42. 41. and 45. 11. of north latitude, and between 70. 40. and 72. 23. of west longitude; extending in length about 168 miles, whilst its average breadth is about fifty miles, and its area is computed at 9491 miles. On the map its shape nearly resembles a wedge inserted between the states of Maine and Vermont, and having Massachusetts for its base. New Hampshire, for its narrow extent, differs more in relative elevation than any other state of the union, and of course the extremes of temperature are in corresponding excess. The line of coast is indented with small inlets of the sea, and skirted by a narrow sandy plain. At no great distance the country swells into a mountainous region, and New Hampshire has justly been called the state of hills, and also the granite state. The highest peaks of the White Mountain range, some of them 7000 feet in height, are more elevated than any others in the United States, with the exception of the Rocky Mountains. Between the Merrimack and the Connecticut are situated many considerable mountains; the names of the principal heights being Monadnock, Sunapee, Kearsarge, Carr's Mountain, and Moosehillock. As a whole, the physiognomy of New Hampshire is bold and prominent, and, although rugged, often sublime in the highest degree. The mountains of the state are in the centre, with a zone of finely-diversified hill and dale country around, the hills consisting generally of stony and moist land, and affording excellent pasturage. There are no extensive barrens, and most of the land is capable of cultivation. Many of the valleys are beautifully green, sheltered, and fertile. The rivers in particular have rich alluvial bottoms or intervale lands, the soil, although encumbered with stones, having a considerable degree of fertility. The state originally was heavily timbered, and in the interior there are still considerable tracts of forest country. There are extensive plains of warm, light, sandy, and peculiar soil, resembling, when cleared, the poorer lands of the high western prairies, covered in their natural state with white pine, and called pine plains. Mount Washington, one of the White Mountains, often visited by travellers, Mr Hinton thus describes: "After climbing the side of the mountain for some distance, the forest trees begin to diminish in height, till, at the elevation of about four thousand feet, you come to a region of dwarfish evergreens, about the height of a man's head, which put forth numerous branches, and surround the mountain with a formidable hedge, a quarter of a mile in thickness. On emerging from this thicket, you are above all woods, at the foot of what is called the bald part of the mountain, which is very steep, and consists of a huge pile of naked rocks. After attaining the summit, the traveller is recompensed for his toil, if the sky be serene, by a most noble and extensive prospect. On the south-east there is a view of the Atlantic Ocean, the nearest part of which is sixty-five miles distant in a right line; on the south, Winnipiseogee Lake lies full in view; in the south-west is the lofty summit of Moosehillock; and far away in the horizon is the Grand Monadnoc. The barren rocks, which extend a great distance in every direction from the summit, add a melancholy cast to the grandeur of the scene. The notch or gap in the White Mountains is also frequently visited as a curiosity. It is on the west side of the mountains, near the source of Saco River. It is a deep and narrow defile, in one part only twenty-two feet wide. The mountain appears as if cloven quite to its base, perpendicularly on one side, and on the other at an angle of forty-five degrees." The Lake of Winnipiseogee, mentioned above, is the largest sheet of water in New Hampshire, being about twenty-three miles in length. It is sprinkled with numerous islands, and abounds in the finest kinds of fresh-water fish. Umbagog

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Lake is situated partly in this state and partly in Maine. Squam, Ossipee, Sunnapee, and Newfound Lakes, are also large collections of water. Five of the largest rivers of New England have their sources in this state, viz. the Connecticut, Merrimack, Androscoggin, Saco, and Piscataqua. There are also a number of inferior streams; and, throughout, New Hampshire is remarkably well watered, the water being generally of the purest quality. In reference to the geological features of the state, it may be mentioned, that the high ridge of mountains which divides the waters of the Connecticut from those of the Merrimack is composed of the older primitive rocks. Granite prevails in the northern and more elevated part, and mica slate in the southern. A beautiful fine-grained granite occurs in many parts of the state, and great quantities of it are transported to Boston as a building stone. To the eastward of the great ridge, mica slate, gneiss, and greenstone, are found. Steatite or greenstone of good quality is found at Orford and Franconia, and primitive limestone abounds in several places. New Hampshire also possesses beds of iron ore of excellent quality, and copper ore has likewise been discovered. Plumbago is found at some places in large quantities, and of excellent quality. These are the principal minerals which this state produces in such quantities as to be much regarded by the inhabitants.

The climate of New Hampshire is subject to the extremes of heat and cold, and to great and sudden changes, yet it is reckoned healthy, the air being generally pure and salubrious. Winter commences in November, and continues till April, the lakes being ordinarily frozen four months in the year, during six weeks of which travelling by means of a species of sledge is quite common, both on the ice and on terra firma. The open fields are commonly cleared of snow by the end of April; but the cold weather, which commences as early as the first of September, continues till May. In all the states in this neighbourhood the autumn is a delightful season. New Hampshire is an agricultural state, and by far the greater number of the inhabitants are engaged in the cultivation of the soil. The articles principally cultivated are, wheat, rye, Indian corn, oats, barley, pulse, and flax. The quantity of live stock is considerable, consisting of horned cattle, sheep, swine, and horses. Apples are abundant, and no good husbandman considers his farm as complete without an orchard; but other kinds of fruit are not so extensively cultivated. The principal articles of export are, lumber, fish, beef, pork, horses, neat cattle, sheep, flax-seed, and pot and

pearl ashes. The manufactures of New Hampshire have of late years greatly increased. In 1831 there were forty cotton mills, which manufactured during that year 29,060,500 yards of cloth, and employed 875 males and 4090 females, besides some children. There are likewise some woollen establishments, ten or twelve paper mills, a number of iron foundries, and works for preparing the ore; and glass is also manufactured. In this and in some other states, large quantities of carpeting, of an inferior quality, are made in families, but these are not noticed in the estimated amount of exports. Mr Pitkin, in his statistics of the United States (1835), observes regarding this manufacture in New Hampshire: "The agent for New Hampshire, in his return to the secretary, says that the amount of carpeting made in the counties of Rockingham, Strafford, Grafton, and Coos, mostly in families, and sold in other states, exceeds, in his opinion, the amount of foreign articles consumed." The value of the imports from December 1832 to December 1833 was 167,754 dollars; and the value of the exports for the same period was, of domestic produce, 145,355 dollars, and of foreign produce, 9903 dollars; total, 155,258 dollars; the tonnage entered being 17,126. From the same source (the American Almanac) we learn, that for the year ending the 30th of September 1835, the value of the imports was 71,514 dollars; that of the exports, of domestic produce, 75,076 dollars, and of foreign produce, 6605 dollars, total, 81,681 dollars; whilst the tonnage which entered was, 6564, and that which departed, 3996 tons. This remarkable falling off in the trade of the state we have no other means of accounting for, than by supposing that the trade in this part of the United States is becoming more and more concentrated at Boston, where goods of all kinds can be more readily disposed of; and this, we have been informed by a native of the country, is the fact. Amongst the towns where the principal manufacturing establishments are situated may be mentioned Exeter, Dover, Peterborough, Franconia, Pembroke, New Ipswich, Keene, and Durham. In 1835, there were in New Hampshire twenty-six banks, having a capital of 2,655,008 dollars, and a circulation of 1,389,970 dollars. The number of post-offices was 289, and the amount of postages for the preceding year was 23,429 dollars. There are several savings' banks and insurance offices in this state. At the commencement of the war in 1775, New Hampshire had only one newspaper; but in 1834 twenty-seven were published, besides a few other periodicals. The following table exhibits a view of the counties and county towns.

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Counties.	Population in 1820.	Population in 1830.	County Towns.	Population.	Distance from	
					Concord.	Washington.
Rockingham.....	40,526	44,452	{ Portsmouth.....	8082	45	491
			{ Exeter.....	2759	39	474
			{ Dover... ..	5449	40	490
Strafford.....	51,415	58,916	{ Gilmanton.....	3816	20	500
			{ Gilford.....	1872	30	504
			{ Rochester.....	2155	40	500
Merrimack.....	32,743	34,619	Concord.....	3727	...	474
Hillsborough.....	35,781	37,762	Amherst.....	1657	30	448
Cheshire.....	26,753	27,016	Keene.....	2374	55	431
Sullivan.....	18,628	19,687	Newport.....	1913	40	467
Grafton.....	32,989	38,691	{ Haverhill.....	2153	67	509
			{ Plymouth.....	1175	40	515
Coos.....	5,151	8,390	Lancaster.....	1187	116	558
Total.....	243,986	269,533				

Portsmouth, the largest town, and the only seaport in the state, is situated on the south side of Piscataqua River, three miles from its junction with the sea, in latitude 43. 4. north, and longitude 70. 45. west. The harbour is consi-

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dered as excellent, having sufficient depth of water for vessels of any size, being easy of access, protected from every wind, and, owing to the rapidity of the tide, never frozen. It is so well fortified by nature, that it can be made secure against any attack, with little trouble or expense. Several forts have been planted upon commanding positions. A lighthouse on Great Island indicates the entrance, and the largest ships can come close up to the wharfs. Portsmouth is well provided with houses of public worship, and contains a custom-house, an insurance office, and several banks. This town enjoys considerable trade; but as a great portion of that from the interior of the state centres at Boston, and a part at Portland, its commerce is not so extensive or flourishing as it would otherwise be, and, as has already been shown, it is on the decline. In Navy Island, on the Piscataqua, opposite to Portsmouth, there is a navy yard of the United States. The island belongs to the general government, and is convenient for building ships of war, being well furnished for this purpose. Portsmouth has suffered much from fires at different periods, the places of the buildings destroyed being supplied by brick edifices. A very handsome bridge across the Piscataqua connects it with the state of Maine. This town was settled in 1623, and incorporated by charter in 1633.

Concord, the capital of New Hampshire, and the seat of government, is situated on both sides of the river Merrimack, in latitude 43. 12. north, and longitude 71. 29. west. The principal portion of the town is exceedingly pleasant, extending along the western bank of the river for nearly two miles. It contains a state-house, a state-prison, a court-house, several places of public worship, and above two hundred dwelling-houses. Two bridges connect the chief village with that on the opposite bank, and much of the trade of the upper country centres here; whilst the importance of the town is increased by the boat navigation which has been opened between this place and Boston by means of the Merrimack River and Middlesex Canal. The town of Concord issues three or four gazettes, and is altogether a place of large and growing business. Exeter is a handsome village, fifteen miles south-west of Portsmouth; it is situated at the head of tide-water on the Exeter River, and small vessels ascend to it. This village contains a number of public buildings, with three or four churches, and is the seat of very considerable manufactures. Philips' Exeter Academy, in this place, is one of the most ancient, opulent, and useful institutions in the United States, having many of the advantages and endowments of a college. Dover is a large manufacturing village, situated on the western bank of the Piscataqua, twelve miles north-west of Portsmouth, and through it flows the Cochecho. This river has several falls, the largest of which, being upwards of forty feet perpendicular, is at the centre of the town, and affords water-power equal to any in New England. Large iron and cotton manufactories have been erected upon these falls, and upon others a few miles higher up the river. Dover contains a number of good public buildings, has a considerable share of shipping, and is one of the most flourishing towns in the state. The greatest part of the timber exported from New Hampshire is brought to this place. Keene is a pleasant town, in the south-west part of the state, on the Ashuelot. The principal towns on the Connecticut River are Walpole, thirteen miles north-west of Keene; Charlestown, twelve miles north of Walpole; Hanover, the seat of Dartmouth College; Haverhill, twenty-seven miles north of Hanover; and Bath, adjoining Haverhill, at the head of the boat navigation. There are, besides, numerous thriving and beautiful villages. The common schools are well supported, and flourishing academies are established in many of the towns. Dartmouth College, at Hanover, was founded in 1770, and ranks as the third literary institution in New England. In 1836 there were connect-

ed with it ten instructors, 1858 alumni, 512 ministers, and 186 students, with 6000 volumes in the college libraries, and 8500 volumes in the students' libraries. The funds of this institution are considerable, the annual income being above 4000 dollars. It has likewise a medical school of deserved reputation at Hanover, where there are three professors and about eighty students. Philips' Exeter Academy, at Exeter, is an old and flourishing institution. It has funds amounting to about 80,000 dollars, a library of 700 volumes, and a handsome philosophical apparatus. Its officers are, a principal, a professor of mathematics and natural philosophy, and an assistant. The funds are appropriated in part to the support of theological students. There are a great number of less extensively-endowed academies, and the primary and other schools established throughout the state are upon the general footing of the New England system. The state has a literary fund amounting to 64,000 dollars, formed by a tax of one half per cent. upon the capital of banks. The proceeds of this fund, and also an annual income of 9000 dollars derived from a tax upon banks, are appropriated for the support of schools; and for maintaining common schools, 90,000 dollars are annually raised by a separate tax. There are in New Hampshire 159 churches for Congregationalists, and eleven associations; the Baptists have ninety churches and six associations; the Free-will Baptists have a hundred congregations; the Methodists, seventy-five ministers; the Presbyterians, ten congregations; the Christians, twenty-three congregations; the Unitarians, seventeen congregations; the Friends, fifteen societies; the Episcopalians, nine congregations; the Roman Catholics, two congregations; and the Shakers, two societies. The clergy of New Hampshire are supported by salaries, which are raised by subscription, or by voluntary taxation on property, or by contribution. The average salary of the Congregational ministers is about 400 dollars, that of the Episcopalian 600 dollars, that of the Unitarian 500 dollars, that of the Baptist 300 dollars, but those of other persuasions have still less. The inhabitants are a strong, healthy, industrious, and well-informed people; frugal, religious, and jealous of their rights. The salubrity of the climate is proved by the fact, that many instances of considerable longevity occur in the state.

As in the other states of the Union, internal improvements have within the last ten years made considerable advances in New Hampshire. Several canals have been constructed around falls in the Merrimack, viz. Bow Canal, three miles below Concord, with four locks, and passing a fall of twenty-five feet; Hooksett Canal, fifty rods long, with three locks, and a lockage of sixteen feet, passing Hooksett Falls; Amosheag Canal, with nine locks, and a lockage of forty-five feet, passing Amosheag Falls, nine miles below Hooksett Falls; Union Canal, immediately below Amosheag, overcomes seven falls in the river, and has seven locks in nine miles. A canal is now in progress around Sewall's Falls, in Concord. The Nashua and Lowell Railroad, extending from Nashua, New Hampshire, to Lowell in Massachusetts, about fifteen miles in length, was incorporated in the year 1836, and is now (1837) in progress. This railroad is expected to be continued from Nashua to Concord. The Concord Railroad Corporation has been organized.

The early history of New Hampshire will be found in the article NEW ENGLAND. In the year 1741 a final separation took place between it and Massachusetts. A constitution was established in 1784; but in 1792 this constitution was altered and amended by a convention of delegates held at Concord, and it is that now in force. The legislative power is vested in a senate and house of representatives, which together are styled The General Court of New Hampshire. Every town or incorporated township having one hundred and fifty rateable polls may send one representa-

New
Haven.

tive, and for every three hundred additional polls it is entitled to an additional representative. The senate consists of twelve members, who are chosen by the people in districts. The executive power is vested in a governor, and a council which consists of five members. The governor, council, senators, and representatives, are all elected annually by the people, their term of service commencing on the first Wednesday in June, upon which day the general court meets yearly at Concord. The right of suffrage is granted to every male inhabitant of twenty-one years of age, excepting paupers, and persons excused from paying taxes at their own request. The judiciary power is vested in a superior court and a court of common pleas. The judges are appointed by the governor and council, and hold their offices during good behaviour, but not beyond the age of seventy years. (R. R. R.)

NEW HAVEN, a city of Connecticut, one of the United States of North America. It lies round the head of a bay, which stretches inwards about four miles from Long Island Sound, seventy-six miles north-east from New York, and stands on a large and beautiful plain, which is bordered on the north partly by eminences called East and West Rock, presenting bold and almost perpendicular columns of bare trap rock from three to four hundred feet in height. Upon the eastern and western sides the city is skirted by small rivers, and extends from east to west three miles, being about two miles in width. It is regularly laid out, and consists of two parts, the old and the new town. The former was originally laid out in one large square, and is divided into several smaller squares. The central square is intersected by a very fine street, in which three handsome churches have been erected; and it also contains a new state-house, built after the model of the Parthenon, and ranking with the best American buildings. The public square and the principal streets are ornamented with trees; and a great part of the dwelling-houses have gardens filled with fruit trees, which give to the city a rural and delightful appearance. New Haven contains eight or nine places of public worship, Congregationalists and Episcopalians being the most numerous sects. There is a jail, an almshouse, a custom-house, a museum, two banks, two insurance offices, an institution for popular lectures, and a number of printing offices, from which five or six newspapers and a few other periodicals are issued. Yale College consists of ten buildings; four halls one hundred feet by forty, and four stories in height, containing thirty-two rooms each for students, a chapel, a medical college, a laboratory, and other necessary apartments. According to the American Almanac for 1837, the state of this institution was as follows:—Instructors, twenty-seven; alumni, 4485; ministers, 1297; students, 413; volumes in the college libraries, 10,500; and volumes in the students' libraries, 15,000. The philosophical and chemical apparatus are good, and the cabinet of minerals is the most valuable in the United States. In connection with this establishment there are theological, medical, and law schools; and the place is celebrated for the number of its boarding schools, there being seldom fewer than one thousand persons who come hither from abroad for the purpose of education. The harbour of New Haven is well defended from winds, but is shallow, and gradually filling up with mud; an evil which has been remedied in part by the construction of a wharf, about a mile in length, extending into the harbour. The maritime commerce of this city is greater than that of any other place in Connecticut, and it owns a considerable amount of shipping. Both the foreign and the coasting trade are extensive, and packets and steam-boats ply regularly between New Haven and New York. It was first settled by the English in the year 1638, and, as the capital of the colony of New Haven, continued distinct from that of Connecticut till the year 1665. The legislature of the state meets alternately

here and at Hartford. The population in 1820 amounted to 7147, in 1830 to 10,678, and in 1837 to about 13,000. Long. 72. 57. W. Lat. 41. 18. N.

NEWHAVEN, a town of the county of Sussex, and the hundred of Holmstrough, sixty miles distant from London. It stands at the mouth of the river Ouse, and is the port of Lewes, where the custom-house is established. It was formerly a place of more importance than at present; but the harbour has been neglected, and nearly choked up by sand. It is sometimes called Meeching. The population amounted in 1801 to 584, in 1811 to 755, in 1821 to 927, and in 1831 to 904.

NEWHAVEN, an ancient and considerable fishing village, situated on the Frith of Forth, less than two miles north from Edinburgh, and one mile west from Leith. The village is formed by a street running contiguous with the shore, with several back lanes, and in appearance it has nothing to recommend it to attention. It possesses a low-water pier, which affords accommodation to the ferry and other steamers. A handsome chapel has lately been erected at the west end of the village, which forms a subsidiary place of worship, or chapel of ease, to North Leith church. The inhabitants are a most industrious race, both sexes being busily employed, the men in procuring the fish, and the females in carrying them to the market. The oyster-bank is valuable, and yields fish of excellent quality. At the west end of the village there has been erected within these few years a considerable suburb, called Trinity, consisting chiefly of houses built in the villa style, and cottages for sea-bathing quarters. There is a chain-pier here, built by Captain Brown, from which steamers for various quarters hourly depart. At Granton, about a mile farther west, a harbour is considerably advanced for the accommodation of large steamers. Along with Leith, Portobello, Musselburgh, and Fisherrow, it returns a member to parliament. The superiors of the place are the lord provost, magistrates, and town-council of Edinburgh.

NEW HOLLAND. See AUSTRALASIA.

NEWINGTON, a parish of the county of Surrey, in the hundred of Brixton. It is nearly adjacent to London, or rather to Southwark, and by the reform act contributes to the election of two members of parliament along with Lambeth and Camberwell. It is frequently called Newington-Butts, from having formerly been the place where the citizens of London practised archery. The population amounted in 1801 to 14,847, in 1811 to 23,853, in 1821 to 33,047, and in 1831 to 44,526.

NEWINGTON-STOKE, a parish in the county of Middlesex, and hundred of Ossulton, two miles and a half from London, on the road from Shoreditch. The population amounted in 1821 to 2670, and in 1831 to 3480.

NEW LONDON, a city and port of entry in Connecticut, North America, situated on the western bank of the river Thames, about three miles from its mouth. The town is irregularly laid out, but has convenient public buildings, and several churches for various denominations of Christians. The harbour is the best in the state. It is defended by Fort Trumbull on the western side of the river, and by Fort Griswold on the eastern side, in Groton. A lighthouse has been erected upon a point which projects considerably into the Sound. The commerce is extensive, and packets and steam-boats ply regularly between this port and New York. The population in 1836 was about 6000. Long. 72. 9. W. Lat. 41. 22. N.

NEWMILLS, a considerable burgh of barony, situated on the right bank of the river Irvine, in the parish of Loudon, Ayrshire. It was erected by royal charter in 1490, and is governed by two bailies, a chancellor, treasurer, twelve councillors, and a town-clerk. The inhabitants are generally weavers. The population in 1821 amounted to 1543, and in 1831 to 1650.

Newhaven
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New London.

New
Orleans
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Newry.

NEW ORLEANS. See the article LOUISIANA.

NEWPORT, a small town, or rather village, of Cornwall, in the parish of St Stephen, near to Launceston. The parish in which it stands contains 1084 inhabitants.

NEWPORT, a market-town of the county of Salop, in the hundred of South Bradford, 140 miles from London. It is situated upon a plain on the borders of Staffordshire. The population amounted in 1821 to 2343, and in 1831 to 2745.

NEWPORT, a town of the county of Pembroke, in South Wales, distant 244 miles from London. It is situated on the river Nevern, which is navigable, and runs into the Bristol Channel. The population amounted in 1831 to 1798.

NEWPORT, a market-town of the county of Monmouth, 147 miles from London. It stands at the mouth of the river Usk, across which there is a fine bridge. A canal, divided into two branches, and running into great coal-fields, has created a large trade in coals between this town and the opposite ports of the Bristol Channel in the counties of Somerset and Devon. The town is governed by a mayor, six aldermen, and seventeen councillors. It returns two members to parliament. The population amounted in 1821 to 4001, and in 1831 to 5441.

NEWPORT, a town situated within the parish of Carisbrook, in the Isle of Wight, and the capital of that island. It is seventy-nine miles from London, and stands upon a gentle elevation close to the river Medina. It is a well-built town, with a good market-place, wide streets, and respectable dwellings. It is governed by a mayor, six aldermen, and seventeen councillors. About one mile from the town is Carisbrook Castle, a remarkable pile, celebrated for the imprisonment of Charles I. within its walls. It is still in tolerable preservation. The population amounted in 1821 to 4059, and in 1831 to 4081.

NEWPORT. See the article RHODE ISLAND.

NEWPORT-PAGNELL, a town of the county of Buckingham, in the hundred of the same name, fifty-one miles distant from London. It stands on the river Ouse, where the water of the small river Lovett falls into that stream. The church, situated upon an elevation, is an ancient and magnificent building. Considerable occupation is afforded in making bone-lace and paper. It was long the residence of the poet Cowper. The population amounted in 1821 to 3103, and in 1831 to 3385.

NEW ROSS (anciently ROSEPONTE) is not, as its name might import, a new town, but one of considerable antiquity, and is called new only to distinguish it from an older place in the neighbourhood, also called Ross, but now of no importance. New Ross is denominated an ancient borough in the charter which was granted to it by James I. It is situated on the left bank of the river Barron, in the county of Wexford, at the distance of eighty-six statute miles from Dublin. The river is navigable up to the town for vessels of 200 tons burden. On the banks are extensive quays and lofty warehouses. A thriving export trade is carried on in agricultural produce, and the commerce of the town is increasing, and likely to increase considerably. The borough of New Ross returns one member to parliament. In 1831 the population amounted to 5011.

NEWRY, a borough town in Ireland, fifty miles from Dublin. It is situated on the river Newry, which, with the canal, divides the town into two portions, the western part being in the county of Armagh, while the eastern and the most considerable part is in the county of Down. The connection between the two is maintained by several bridges, four of which are of stone. The river runs into the head of Carlingford Bay, one of the most beautiful of the Irish loughs, at a place called Warren Point, distant five miles from Newry. To this point vessels of the heaviest tonnage can sail, and their goods are taken up to the town in smaller vessels by means of the Newry water

and ship-canal. From Newry there is a continuation of the canal to Lough Neagh, from which there is communication to the north of Ireland, and the Atlantic, by the river Bann. Newry is thus in a position admirably adapted for the export of agricultural produce, and the extension of an inland trade. The borough includes within its limits a large rural district, containing five considerable town-lands, and its surface extends to 2500 statute acres. The old part of the town is built on a ridge, in an irregular and confined manner. The modern part is well built, and contains excellent houses and shops. Both parts are lighted with gas. There is a good number of public buildings, among which may be noticed the established church of St Mary's, the Roman Catholic chapel, the Presbyterian chapel, the assembly rooms, and custom-house. In addition to those places of worship, there is a number of others connected with various religious bodies. The principal business of Newry depends on its flour and oat-meal mills, and on the linen, yarn, and cotton trade, of which the first is carried on extensively. Besides those branches of business, there are extensive iron-founderies; forges for making spades, shovels, and other iron goods connected with ship-building; a distillery, a brewery, salt-work, flint-glass work, and cordage manufactory. The export of butter and the sale of cattle form an important branch of the export trade. The greater part of the import trade is in timber and coal. Steamers sail regularly to Liverpool and Glasgow, in addition to the vessels trading to America, the Mediterranean, Odessa, the Baltic, Archangel, and various ports in the united kingdom. The amount of tonnage which entered into Newry and its sub-ports in 1835 was 96,980, and in that of 1836, 87,612. The number of registered vessels in 1835 was 161, with a tonnage of 9060. The amount of gross customs-duty received in 1836 was L.58,806, and in 1837, L.43,867. The value of the export trade in 1835 was L.616,836, and of the import trade in the same year L.568,711. In both cases this includes the coasting trade. Newry returns one member to parliament. The population in 1821 amounted to 10,013, and in 1831 to 13,065.

NEWSPAPERS are publications issued in numbers, consisting generally of single sheets, which, appearing at short and regular intervals, convey intelligence of passing events, and at the same time advocate certain principles in politics, literature, and religion, but chiefly in the first of these departments.

One of the most remarkable characteristics of modern, The nature and practical utility of newspapers. as compared with ancient times, is the periodical press, an engine affecting society in all its relations, and forming one of the most important safeguards of public liberty. Under this head are usually included reviews, magazines, and other publications of a similar kind, as well as newspapers. But although, upon certain grave and important questions, the former sort of periodicals may contribute more to enlighten the public mind, and to guide public opinion into safe and proper channels; yet the wide diffusion of newspapers, their rapid communication of intelligence on subjects of immediate interest, their hasty and rough but often vigorous comments on the leading events of the day, and the means which they thus afford of acting immediately and constantly upon the public mind, in all its varied states, render them much more powerful as instruments of political influence, and thus secure to them a prominence to which, intrinsically, they are by no means entitled. They circulate every kind of information with equal celerity and regularity; they bring to every man's home and fireside intelligence of all that is passing in the great world, whether at home or abroad, in war, in politics, in government, in commerce, and in the common affairs of life; they are registers of extraordinary events, as well as of ordinary occurrences, of discoveries and inventions, as well as accidents, offences, calamities, or crimes; they often diversify their contents with scienti-

Newspapers.

Newspapers.

fic and literary notices; and from the variety of facts and information which they contain, they are indispensable to many classes of society, and more or less agreeable or instructive to all. To persons engaged in mercantile transactions they are peculiarly important, inasmuch as, from the advertisements they circulate, and the details they furnish respecting the supply and demand of commodities in all parts of the world, with the prices and the regulations by which these are affected, newspapers supersede a great mass of epistolary correspondence; place merchants in remote situations upon an equality, in point of information, with those frequenting the principal marts; and wonderfully quicken all the movements of commerce. Besides, these publications have themselves become a considerable article of commerce, in the production of which skill, talents, and capital are equally requisite.

Historical notices of their origin and progress.

An historical account of newspapers, and of periodical publications in general, is still a desideratum in literature; nor can it be doubted, that if the task were undertaken by an individual of competent ability, and executed with the requisite care and research, the result would be a work of the greatest interest and importance. From the researches of Mr Chalmers, it appears that to the state of Venice belongs the honour of having produced the first *gazetta* or newspaper, which appeared as early as the year 1536. The war which the republic of Venice then waged against Suleiman II. in Dalmatia, appears to have given rise to the custom in that state of communicating both military and commercial information in written sheets (*notizie scritte*), which were read at a particular place by those desirous of learning the news, and who paid for this privilege in a coin that is no longer in use, called *gazetta*. From this circumstance, it would seem, the name was, in course of time, transferred to the newspaper itself, not only in Italy and France, but at length also in England and in other countries.¹ The first of these *notizie* or gazettes was a monthly paper, circulated, or rather read, at Venice. The jealousy of the government prevented its being printed; and the *gazetta* continued to be distributed in manuscript till towards the close of the sixteenth century. In the Magliabecchi library at Florence there are still preserved thirty volumes of these *gazettas*, all of them in manuscript. Those who first wrote newspapers in Italy were commonly called *menanti*, because, according to Vossius, they intended, by these loose papers or sybilline leaves, to spread about defamatory reflections; and for this reason all such gazettes were prohibited by Gregory XIII. in a bull entitled *Minantes*, from the Latin *minari*, to threaten. But *Ménage*, with more probability, derives the name from the Italian verb *menare*, which signifies to lead, direct, or produce.

The first English newspaper appeared in the reign of Queen Elizabeth, during the alarm occasioned by the approach of the Spanish Armada to our shores. In the British Museum, there are several copies which were printed in 1558, whilst the Spanish fleet was in the English Channel; in order that, during a moment of general anxiety, the circulation of false reports might be prevented by publishing real information. This newspaper is entitled *The English Mercurie*, which, by authority, "was imprinted at London, by Christopher Barker, her highnesses printer, 1583." Burleigh's newspapers, however, were all extraordinary gazettes, not regular journals, and they were published from time to time, according as that skilful statesman desired to soothe, inform, or exasperate the people. Periodical papers appear to have first come into general use during the civil wars in the reign of Charles I., and in the time of the com-

monwealth; in fact, each party had their newspapers, to disseminate sentiments of loyalty, or to foster a spirit of resistance against the inroads of power. The country was accordingly overflowed with tracts of every size, and of various denominations, many of them written with great ability, and displaying uncommon courage. *Mercury*, however, was the prevailing title, although generally qualified with some epithet; and the quaintness peculiar to the age is curiously exemplified in the names of some of the "news-books," as the Dutch Spye, the Scots Dove, the Parliament Kite, the Secret Owle, Heraclitus Ridens, the Parliament Vulture, the Parliament's Screech Owle, the Loyal Scout, and so forth. A catalogue of the different Mercuries would exhibit a curious picture of those singular times. *Mercurius Acheronticus* brought hebdomadal tidings from the infernal regions; *Mercurius Democritus* communicated marvellous intelligence from the world in the Moon; the Laughing Mercury gave exact information of proceedings at the antipodes; and the *Mercurius Mastix* lashed unmercifully all other Mercuries, Scouts, Posts, Spies, Discoverers, and Intelligencers. The Restoration and the Revolution occasioned each the establishment of a number of newspapers in England, all of which have long since disappeared; nor was it until the reign of Queen Anne that London could boast of a daily paper. The first of the class published in Great Britain was the *Daily Courant*, which for a considerable time occupied the field alone; but at length two rivals appeared in the *Daily Post* and the *Daily Journal*, and, in 1724, we find that these three papers were simultaneously published. Little change seems to have taken place during the reign of George I.; but in that of George II. every kind of periodical publication increased abundantly. The number of newspapers annually sold in England, according to an average of three years ending with 1753, was 7,411,757; in 1760 it amounted to 9,464,790; in 1767 it rose to 11,300,980; in 1790 it was as high as 14,035,636, and in 1792 it amounted to 15,005,760.

The victorious arms of Cromwell communicated to Scotland the first newspaper. It appeared at Leith in October 1653, under the title of *Mercurius Politicus*, but, in November 1654, was transferred to Edinburgh, where it continued to be published until the 11th of April 1660, when it came out under the name of *Mercurius Publicus*. This paper was a reprint, for the information of the English soldiers, of a London publication, entitled a *Diurnal of some Passages and Affairs*. But a newspaper of native manufacture soon made its appearance, under the title of *Mercurius Caledonius*. The first number of this journal was published at Edinburgh on the 31st of December 1660, "comprising," as its title bears, "the affairs in agitation in Scotland, with a summary of foreign intelligence." The publication, however, extended only to ten numbers, which, as Chalmers says, "were very loyal, very illiterate, and very affected." Even after the Restoration the newspapers published by authority continued to be reprinted in Edinburgh, and the *Mercurius Publicus* instructed the natives until it was superseded by the Kingdom's Intelligencer. At the era of the Revolution there was not a newspaper printed in Scotland; nor was it until after ten years had elapsed that the *Edinburgh Gazette* was published, in the month of February 1699, by James Watson, author of a *History of Printing*, who, after the publication of forty numbers, transferred it to one John Reid, whose son continued to print the paper even after the union. In February 1705, Watson established the *Edinburgh Courant*, which he relinquished, after the publication of fifty-five numbers; and, in September 1706,

Newspapers.

¹ Some have thought that the word *gazetta* is derived from *gazza* or *gazzera*, a magpie, or chatterer; whilst others deduce it from the Latin *gaza*, colloquially lengthened into *gazetta*, and therefore signifying a little store or treasury of news. From the Italian the word passed into the Spanish language, which has also *gazetista*, signifying one fond of or partial to the gazette. In German, *zeitung* is formed from the ancient *theidinge* or *teidung*, identical with the English *tidings* and the Swedish *tidningar*.

Newspapers.

he commenced the Scots Courant, which he continued to print until after the year 1718. To these papers were added, in October 1708, the Edinburgh Flying Post; in August 1709, the Scots Postman, printed for David Fearn by John Moncur; and, in March 1710, the North Tatler, printed by John Reid for Samuel Colvil. In 1715, a newspaper was for the first time attempted in Glasgow, under the title of the Glasgow Courant; but this did not prevent the establishment of other newspapers in Edinburgh. In March 1714, Robert Brown began to print the Edinburgh Gazette, or Scots Postman, twice a week; and, in December 1718, the town-council gave an exclusive privilege to James M'Ewen to publish three times a week the Edinburgh Evening Courant; upon the condition, however, that "the said James" should, before publication, "give ane coppie of his print to the magistrates." This journal still continues to be published, but whether or not the original stipulation be complied with, we are unable to say. The establishment of the Courant was followed by that of the Caledonian Mercury, the sequel of *Mercurius Caledonius*, the first number of which appeared on the 28th of April 1720. The original proprietor was a lawyer of the name of Roland, upon whose decease, in 1729, the property of the paper was transferred to Mr Thomas Ruddiman, the original editor, and continued in his family until May 1772, when it was sold by the trustees of his grandchildren to John Robertson, an opulent typographer, along with the printing-house and printing materials. From the commencement, the Caledonian Mercury, like the Courant, has been published three times a week.

London newspapers.

Having given this slight sketch of the origin and progress of newspapers, we now proceed to consider the actual state and condition of this portion of the press amongst ourselves; and here our attention is naturally directed, in the first instance, to the metropolitan journals, which are pre-eminent for the amount and variety of matter they contain, the rapidity with which they are printed and circulated, and the fullness and accuracy of their reports. The establishment of a first-rate London paper is the most complete of the kind in existence. Its activity is immense, extending not only to all that is important at home, but to every thing that is particularly interesting abroad. In 1826, when Mr Canning sent a body of troops to Portugal, in compliance with a demand made by the government of that country, reporters belonging to several London journals accompanied the expedition; and since the commencement of the civil war in Spain, the head-quarters of Don Carlos, and those of the Christino generals, have respectively been frequented by emissaries of the leading morning papers. Reports of the proceedings in the Spanish Cortes, and the discussions in the French Chamber of Deputies, have on particular occasions accompanied those of the debates in the British houses of parliament. Indeed there is almost nothing beyond the reach of their enterprise and activity.

Employed upon each morning paper of the first class there are an editor and sub-editor; from ten to twelve, or even fourteen, regular reporters, at salaries of from four to six guineas each per week; from thirty to thirty-five compositors in the printing-office; several readers, who correct the proofs as they come from the compositors; a certain number of men and boys to attend to the printing machine, and take off the papers as they fall from the cylinders; a publisher and sub-publisher, besides a number of clerks in the office to receive advertisements and keep the accounts, with various other individuals engaged in the performance of subordinate duties. The salary of an editor varies from L.600 to L.1000 per annum, and that of a sub-editor from L.400 to L.600. The largest item in the expenditure of a morning paper is that charged under the head of reporting, which generally amounts to upwards of L.3000 per annum. In fact, the salaries paid weekly to editors, report-

ers, and others upon the establishment, do not fall short of L.180; and if to this be added the expense of occasional reporting, the cost of foreign newspapers and private correspondence, the sums paid for expresses, and various other items which it is unnecessary to enumerate, the total weekly expenditure can scarcely be estimated under L.250, or L.13,000 per annum. The duty of the principal editor commences with the publication of the evening papers, the leading articles of which he has to read, that, if necessary, he may refute or support their statements and arguments. He generally remains at his post until a late hour, prepared to write comments on the foreign journals as they arrive (a duty in which he is generally assisted by the sub-editor), and also to direct attention, in a leading article, to any topic of public interest. During the sitting of parliament, he is frequently obliged to remain at the office of the paper until two or three o'clock in the morning; and such is the energy with which the metropolitan press is directed, that it is not uncommon to see a leading article of nearly a column in length written on a subject which had been debated in the House of Commons until a late hour in the morning. The promptitude of execution which this presupposes is wonderful, and can only be the effect of habit invigorated by the impulses peculiar to the occasion.

But perhaps the most extraordinary part of the machinery of a morning paper is the reporting. The establishment of reporters varies, as already stated, from ten to fourteen; and most of the persons so engaged are gentlemen of education, sometimes students of law, remarkable for their activity and intelligence. During the session of parliament, the reporters of the leading papers attend by turns each day, from the time the business commences, one succeeding the other, according to previous arrangement, and each remaining in the house for half or three quarters of an hour. If the debate be not protracted, or "heavy," as it is called, the reporter in the House of Commons, when relieved, enters a small apartment at the end of the lobby, appropriated exclusively for the purpose, and there arranges his notes, which are seldom taken in short-hand, from the impossibility, in ordinary cases, of finding room in a newspaper for all that a member may say, or even the half of it. He then proceeds at once to the office of the paper on which he is engaged, and by him the attention of the editor is directed to any thing of commanding interest which may have transpired. His slips, as they are written, are handed by the printer to the compositors, whose number during the session of parliament is generally increased; and as one reporter follows another, it is not unusual for a debate which has terminated at midnight to be set up in types, and ready for printing, by two o'clock in the morning. On nights of prolonged discussion, when the houses sit late, some of the reporters, particularly those whose previous task may have proved least onerous, are required to return to the gallery, and take what is called "a double turn." In general, however, owing to the subdivision of labour, the duty of an individual reporter is by no means burdensome, and requires promptitude and facility rather than prolonged exertion. The expertness produced by habit is remarkable, and it not unfrequently happens that a single reporter, from the notes taken in three quarters of an hour, supplies from one to three columns of printed matter to the paper on which he is engaged. Besides the corps of regular reporters attached to a newspaper, there are several occasional ones, called "penny-a-line men," from the circumstance of their furnishing articles of intelligence at a fixed price per line. The reporters of this class are to the body of the press what the Cossacks are to a disciplined army; a species of active but irregular troops, who forage for news in all directions, pick up every scrap that comes in their way, and having dressed it up in their best style, straightway offer it for sale at the newspaper offices.

Newspapers.

Newspapers.

In obtaining intelligence by express, and also in forwarding it in this manner, some of the evening papers have latterly made great exertions. The Courier and the Sun have sometimes published the speech of the king of the French twenty-six or twenty-seven hours after it had been obtained by their agents at Paris; and the latter journal has, on many occasions, forwarded "express editions" to all parts of the country, containing the conclusion of an important debate which terminated several hours after the departure of the mail, and thus anticipating by a day the ordinary course of publication.

Newspapers, in London, are, for the most part, sold to newsmen or news-venders, by whom they are distributed to the purchasers both in town and country. The newsmen, therefore, are the retailers, and for the business of distribution they receive a certain regulated allowance, amounting to two shillings and threepence upon a *quire* (as it is called) of twenty-seven papers. Some of the clerks at the post-office, called clerks of the roads, are likewise considerable news-agents. The stamp-duty charged upon each newspaper was formerly fourpence, with a discount, however, of twenty per cent. on such as were sold at a price not exceeding sevenpence, which reduced the stamp-duty actually paid to threepence and one fifth. But, by the act 6 and 7 William IV. c. 76, this duty has been repealed, and the following duties are now imposed in its stead:

For every sheet, or other piece of paper, whereon any newspaper shall be printed, one penny. But where such sheet or piece of paper shall contain on one side a superficies, exclusive of the margin of the letter-press, exceeding 1530 inches, and not exceeding 2295, the additional duty of one halfpenny is charged; and where the same shall contain on one side a superficies, exclusive of margin, exceeding 2295 inches, a further duty of one penny; provided always that any sheet or piece of paper containing on one side a superficies, exclusive of the margin of the letter-press, not exceeding 765 inches, which shall be published with and as a supplement to any newspaper chargeable with any of the foresaid duties, shall in that case be charged only with the duty of one halfpenny. Then follow definitions of what are to be deemed and taken to be newspapers chargeable with these duties. These are, 1st, Any paper containing public news, intelligence, or occurrences, printed in any part of the united kingdom, to be dispersed and made public; 2dly, any paper printed in any part of the united kingdom weekly or oftener, or at intervals not exceeding twenty-six days, containing only or principally advertisements; and, 3dly, any paper containing any public news, intelligence, or occurrences, or any remarks or observations thereon, printed in any part of the united kingdom, for sale, and published periodically, or in parts or numbers, at intervals not exceeding twenty-six days between the publication of any two such papers, parts, or numbers, where any of the said papers, parts, or numbers shall not exceed two sheets of the specified dimensions, exclusive of any cover or blank leaf, or shall be published for sale for a less sum than sixpence, exclusive of the duty imposed by the act. With reference to this last description of newspapers, it is provided, that no quantity of paper less than a quantity equal to twenty-one inches in length by seventeen inches in breadth, in whatever way or form the same may be made or divided into leaves, or in whatever way the same may be printed, shall, with reference to any such paper, part, or number, as has been above described, be deemed or taken to be a sheet. And it is also generally provided, that any of the several papers before described shall be liable to the duties imposed by the act, in whatever way or form they may be printed or folded, or divided into leaves or stitched, and whether the same shall be folded, divided, or stitched, or not. The

exemptions are, the Police Gazette or Hue and Cry; daily accounts or bills of goods imported and exported; warrants or certificates for the delivery of goods, and the weekly bills of mortality; and also papers containing lists of prices current, the state of the markets, accounts of the arrival, sailing, or other circumstances relating to merchant ships or vessels, and generally any other matter wholly of a commercial nature; provided such bills, lists, or accounts do not contain any other matter than that which has usually been comprised in them.

The *regulations* prescribed by this act are the following, viz. A discount of twenty-five per cent. on the above duties is allowed to newspapers printed in Ireland. To prevent fraud in the returns as to newspapers, it is enacted that, from the 31st of December 1836, a separate or distinctive stamp or die must be employed for each paper. No person can print or publish a newspaper until after a declaration has been made and lodged at the stamp-office, containing certain particulars specified in the act as to the names and addresses of the printer and certain of the proprietors, &c. of such paper, under a penalty of fifty pounds; and persons wilfully making a false or defective declaration are, upon conviction, to be deemed guilty of a misdemeanour. There are also a number of regulations intended to provide for the discovery and liability of the printer and proprietors, the security of the duties, and the prevention of the sale of unstamped papers. Any person publishing, selling, or disposing of newspapers not duly stamped, is subjected to a penalty of twenty pounds; and it is declared to be lawful for any officer of stamps, or any person authorized by the commissioners for that purpose, to seize any such offender, and take him before any justice having jurisdiction where the offence is committed, who shall summarily determine the matter, and, in default of payment upon conviction, commit such offender to prison for some term not exceeding three calendar months, nor less than one. The penalty for sending abroad newspapers not duly stamped is L.50. Justices may grant warrants to search for unstamped newspapers, to seize presses, &c. used in printing them; on admittance being refused, officers and others may enter forcibly; and persons offering resistance to officers in the discharge of their duty incur a penalty of twenty pounds.

Such are the provisions, exemptions, and regulations of the act 6 and 7 William IV. c. 76. The duty, which formerly amounted (deducting the discount) to threepence one fifth, being thus reduced to one penny, the price of the great majority of the London papers has in consequence been lowered from sevenpence to fivepence; but provincial papers, which are got up at comparatively little expense, are now generally sold for fourpence halfpenny or fourpence; and this is also the case with one or two of the metropolitan journals. The reduction of the price occasioned a considerable increase in the demand for the established journals; and, since the reduction of the duty, a considerable number of new weekly papers also started into existence, both in the metropolis and throughout the country; but hitherto no new daily paper has been established, and several of the weekly prints have already disappeared. Supposing it to have been expedient to reduce the duty, and to fix it at an uniform amount upon all papers, the arrangements prescribed in the act 6 and 7 William IV. are perhaps as unexceptionable as any that could be devised; but some persons are of opinion that it might have been better to assess the duty upon an *ad valorem* principle, making it in every case a certain aliquot part of the price.

The returns of the London journals arise from two sources; the profits on the circulation, and those derived from advertisements. Each paper being now sold to the newsman at fourpence, the sum received by the proprietor for

Newspapers.

Newspapers. paper, printing, and the expense of his establishment, is threepence, or one halfpenny more than under the former law. Advertisements form a considerable source of profit to newspapers; indeed, without this, some of the most widely circulated of their number could not support the great expenditure necessary for carrying them on. Each advertisement published in Great Britain is now charged with a duty of one shilling and sixpence, without distinction of length; but until the year 1833 the duty charged was three shillings and sixpence. In 1832, the advertisements produced L.155,400 in Great Britain, and L.15,249 in Ireland, at least three fourths of which were derived from newspapers.

The following table has been constructed from detailed returns showing the number of stamps issued to each newspaper in Great Britain and Ireland, with the number of advertisements published, and the amount of advertisement duty paid, by each paper during the first six months of the year 1837. The duty is charged at one shilling and sixpence upon each advertisement published in Great Britain, and at one shilling upon each advertisement published in Ireland.

	Number of Papers.	Number of Stamps.	Number of Advertisements.	Amount of Advertisement Duty.		
				L.	s.	d.
London Papers.....	93	15,100,197	292,033	21,902	9	6
English Provincial Papers.....	217	7,290,452	317,474	23,810	11	0
Welsh Papers.....	10	190,955	6,499	487	6	6
Edinburgh Papers.....	13	768,071	20,579	1,543	9	6
Scotch Provincial Papers.....	46	1,121,658	45,371	3,402	16	8
Dublin Papers.....	21	1,493,838	45,848	2,292	8	0
Irish Provincial Papers.....	60	1,049,358	41,284	2,064	4	0
Total in Great Britain and Ireland.....	460	27,014,529	769,088	55,503	5	2

In 1832, when the government duty was charged at three shillings and sixpence upon each advertisement, the produce of this branch of the revenue in Great Britain and Ireland amounted to L.170,649. The portion of this sum derived from newspapers, as distinguished from other periodical publications, has not been stated; but it may fairly be taken at not less than three fourths of the whole, or L.127,986. From the above table, however, it appears that the newspaper advertisement duty, for the first six months of 1837, amounted to L.55,503s. 5s. 2d. which, for the whole year, would give a return from this source alone of L.111,006. 10s. 4d. But in 1833 the duty was reduced to one shilling and sixpence in Great Britain, and one shilling in Ireland, at which rates it is now charged upon advertisements in each country respectively; yet notwithstanding this reduction, it appears that, if the second half of 1837 equal the first, the total produce of that year, arising from advertisements, will fall short of the total produce of 1832, the year before the duty was reduced, by only L.16,980.

French newspaper press. Newspapers were of later origin in France than in England. The earliest notice we have of any publication of this kind is that contained in Saint Foix's curious *Essai Historique sur Paris*, where it is stated that Renaudot, a physician of Paris, sought to amuse his patients by collecting and circulating news, and thus greatly increased his practice. As the seasons were not always sickly, and the doctor had a taste for newsmongering, he considered that he might turn both his time and his talents to account by giving weekly to his patients some fugitive sheets containing the news of various countries; and for this he obtained a privilege in 1632. But there was really no political press in France until the year 1789, when the Constituent Assembly, in the declaration of rights, decreed (5th October) that the free communication of thoughts and opinions is one of the most precious rights of man, and that every citizen may therefore speak, write, and print freely, "sauf à répondre de l'abus de cette liberté dans le cas déterminé par la loi." This decree, which formally recognised the liberty of the press, at the same time called it into existence. But no distinction was made between the various modes of publication, and no greater securities were required for newspapers than for books and pamphlets. The periodical press was a stranger to the habits of the

country, and the public were not prepared for it. Violent and witty pamphlets were indeed written, but no one had yet learned either to write or to read a journal. In this respect the *Moniteur*, an official paper, began the education of the community in France. No journals were previously known, except the *Mercure*, the *Gazette de France*, and the *Courrier de Provence*, which had been the depository of Mirabeau's harangues, before the opportunity had arrived for launching them in the National Assembly. As the passions of men became heated, a new brood was hatched, amongst which Marat's *Ami du Peuple*, and Hébert's *Père Duchesne*, enjoyed a bad pre-eminence. The rapidity and acerbity of the pamphlets of the time were suited to the taste of a people which lived upon excitement. But still a journalist was, in fact, an individual who united and confounded all the branches of the work in his own person; it was Marat, or Hébert, or Camille-Desmoulins. Violent alternations of license and despotism distinguished the most stormy period of the Revolution; yet, in spite of the extravagance of the one, and the disproportionate severity of the other, the press continued to make way. Under the consulate and the empire it was subjected to systematic control. No journal could appear without the authority of the minister of the interior; the number of provincial papers was limited to one for each department, and these were placed under the authority of the prefects. On some occasions, however, Napoleon himself became a journalist, and replied in the *Moniteur* to the manifestoes of the British government. He also encouraged a revival of religious doctrines, the influence of which was felt in literature before it reached the sphere of politics. Of this school the *Journal des Débats* was the centre, and Chateaubriand and Bonald were the organs. Things proceeded in this way till after the disastrous campaign of Moscow, when the liberty of writing and speaking began to be once more asserted, and public opinion was ardently supported by the rising generation; so that, upon the whole, when the French empire was broken up, the press had in some measure taken root in the habits of the country, and the demand for newspapers had become general. Even whilst the expression of opinion was checked, the means of publicity were established and increased. The *Moniteur*, the *Bulletin des Loix*, and the *Journal de la Librairie*, awakened attention to the public interests; each department had a paper of its own; and

Newspapers.

Paris had already several journals, particularly the *Gazette*, the *Journal de Paris*, the *Quotidienne*, and the *Journal des Débats*, which, under the title of *Journal de l'Empire*, had as many as 20,000 subscribers. Literary criticism was installed in the daily papers, and gave birth to the *Feuilleton*, to which the pens of Dussault and Geoffroy imparted that sharp and sparkling vivacity which still preserves its traditional charm. At first, however, it was no better treated by the government of the restoration than it had been by that of the empire. Its history during this period is filled with laws and ordinances, succeeding each other at short intervals, and marking the various turns of the conflict between the men of the past and those of the present time, the restored government, and the liberal party, as it is called. But in 1819 a law was passed which had the merit of acknowledging sound principles respecting the rights of publicity; and by another enactment, made in 1828, a sort of compromise was entered into between the rights of the press and the prejudices of the government. Since the revolution of July 1830, however, a material change has taken place. In 1819, the interest and the position of the parliamentary tribune and the press were identical; since 1830, they have become two distinct and rival powers, one or other of which must ultimately give way. In the meanwhile, the gagging enactments of the year 1835, which characterize the existing legislation, have given a decided preponderance to the tribune, and, through it, to the government.

The French journals fluctuate so greatly that they can only be described generally in connection with the events of the time. When M. de Villèle came into office, the two organs of the liberal party were the *Constitutionnel* (established in 1815), the *Courrier Français*, the *Journal du Commerce*, and the *Journal de Paris*; whilst the royalist party divided their patronage between the *Journal des Débats*, the *Gazette de France*, and the *Quotidienne*. The *Aristarque* and the *Oriflamme* were then set up by the ultra-royalists; and Villèle established the *Etoile*, an evening paper devoted to the personal defence of the minister. The *Journal des Débats* now seceded from the side of government, and brought over to the liberal party the support of that portion of the middle classes which had espoused the interests of the restored monarchy. The *Globe* and the *Producteur* led on the public to the study of science, literature, politics, political economy, and philosophy, and sowed the seeds of instruction in many minds where they have since ripened into an abundant harvest. The daily papers obtained an entire mastery over public opinion. The *Constitutionnel* and the *Journal des Débats* were really the kings of the multitude; and their slightest hint acted sympathetically upon the resolutions of the community.¹ The administration of M. de Martignac, which was a compromise with the liberal party, abolished the censorship, and reduced the securities paid in by the journals. It only gave birth to one ministerial paper. But that of M. de Polignac, which was openly hostile to the liberty of the press, elicited a new class, resolved to go all lengths, and to yield to no obstacle. Then appeared the *Universel*, a partisan of absolute power; the *Temps*, representing the *centre gauche*; the *National*, detached from the *Constitutionnel*, and conducted by M. Thiers, in the interest of the house of Orleans; and the *Globe*, which now became a daily paper. In the provinces appeared the *Tribune des Départements*, and the *Courrier des Electeurs*; but the great body of the people still clung to the old-established and

well-known papers. The popularity of the *Constitutionnel*, the *Journal des Débats*, and the *Courrier Français*, increased with the danger. When the revolution of July broke out, the first of these papers had a circulation of 22,000, and the second of 18,000; and each of the twelve shares in the former journal, which were originally taken at L.200, though the money was never paid, returned a dividend of L.2000. In fact, the revolution of July was the royal reign of the press, when the two journals already mentioned enjoyed an almost supreme authority. But since that period it appears to have undergone very considerable changes. The republican party was the first to multiply its organs. In a short time it brought out the *National*, the *Mouvement*, the *Révolution*, the *Tribune*, the *Patriote*, the *Avenir*, the *Réformateur*, the *Populaire*, and the *Bons Sens*. The two last were Sunday papers, which only cost one penny each, and were sold by hawkers. As many as 50,000 copies of the *Bons Sens* have been sold in this manner in one day. But the law which subjected the public hawkers to the monopoly of the police put a stop to this traffic; the republican press shared the same fate as the republican *emeutes*; and subsequent enactments gave it the *coup de grace*. The *Bons Sens* and the *National*, however, still maintain a languishing existence as daily papers. From 1832 to 1835, whilst the *tiers-parti*, headed by Dupin, had a majority in the Chambers and in the country, several journals were published in harmony with that state of affairs, and some of the old ones moderated their tone, or changed their denominations. In 1836, newspapers were founded, not in support of any party or opinion, but purely on speculation, the profits realized by a few fortunate journals having tempted adventurers to embark in such undertakings. We may add, that a few enterprising individuals have undertaken to bring the daily press in France to the level of the humblest fortunes, by publishing newspapers at forty francs, or L.1. 12s. per annum. The projector of this system was M. Emile Girardin, deputy of the Creuse, whose own paper, *La Presse*, has obtained a circulation of about 12,000. But the ultimate success of the experiment is far from being certain.

We have no means of ascertaining with any degree of precision the actual number of the French journals, and the extent of their circulation respectively. In an article written in 1829, and inserted in the *Compilateur*, the author, speaking of things as they then stood, says, "There are in Paris a hundred and fifty-two journals, literary, scientific, and religious, and seventeen political; in all a hundred and sixty-nine. Of these papers a hundred and fifty-one are constitutional, or, as they are called, liberal, the eighteen others being more monarchical in their spirit. The hundred and fifty-one constitutional journals have, it is stated, 197,000 subscribers, 1,500,000 readers, and produce an income of 1,155,000 francs (L.46,200); the eighteen others have 21,000 subscribers, 192,000 readers, with an income of 437,000 francs (L.17,480). The *Moniteur*, the official paper, has from 2500 to 4000 subscribers, principally public functionaries; the *Constitutionnel*, from 18,000 to 20,000 subscribers; the *Journal des Débats*, from 13,000 to 14,000 subscribers; the *Quotidienne*, 5000 subscribers; the *Courrier Français*, 4500 subscribers; the *Journal du Commerce*, 3500 subscribers; the *Gazette de France*, 7000 subscribers; the *Messenger des Chambres*, 2500 subscribers; the *Tribune des Départements*, a new paper, 100 subscribers; and the *Nouveau Journal de Paris*, from 1000 to 1500

Newspapers.

¹ When General Foy died, the daily press called upon the country to provide for his children, and a million of francs was soon subscribed. The same power collected 200,000 persons to attend the obsequies of Manuel, in presence of the guards drawn out, and at the risk of a battle. At the general election, in 1827, the press designated the candidates, and decided the contests. More recently, the funeral of General Lamarque was attended by an immense assemblage, which the press had called together, at the imminent hazard of another conflict in the streets of Paris.

Newspapers. subscribers. All these are published in the capital. The journals printed in the provinces are calculated at seventy-five, exclusive of papers for advertisements and ministerial bulletins. Of these, sixty-six are constitutional, being supported only by subscribers of the same way of thinking. One, the *Mémorial de Toulouse*, is supported by the archbishop of that diocese; four are, it is asserted, paid from the secret funds of the Jesuits; and the other four are monarchical, but possess little influence." Since the period to which this applies, however, great changes have taken place, and the circulation of some of the leading daily journals has declined. Nevertheless, it appears that a share in the *Constitutionnel* is still worth twenty-five times its original cost; that the shares in the *Gazette des Tribunaux*, which, at the outset, were worth only 500 francs, are now sold for 30,000; and that the *Gazette de France* has, for a long time, brought the proprietor an income of 200,000 francs, or L.8000 a year.

German papers.

In Germany, newspapers originated in the *Relations*, as they were termed, which sprung up at Augsburg and Vienna in 1524, at Ratisbon in 1528, at Dillingen in 1569, and at Nuremberg in 1571, and which appeared in the form of letters printed, but without date, place, or number. The first German newspaper in numbered sheets was printed in 1612, and entitled "Account of what has happened in Germany and Italy, Spain and France, the East and West Indies, and other countries." Since that time, public papers have successively appeared in different places, and under various titles, but all of them subject to a strict censorship. In Germany, however, as in France, the periodical press was of little importance till the era of the French Revolution, and, in comparison with the state of matters in these countries, it has always remained so. By the resolutions of the German Diet in 1819, it was placed under strict supervision, and still continues subject to a vigilant censorship. Till the commencement of the French Revolution, the *Hamburger Correspondent* was almost the only paper in Germany which derived its information respecting foreign countries from original correspondence; and at that time its sale was estimated at between 30,000 and 36,000 copies. Subsequently, however, it declined, principally owing to the occupation of Hamburg by the French, and its sale amounted to only a few thousands. In the year 1828, twenty-one gazettes, daily and weekly, were published at Hamburg. But a new kind of periodical sprang up in Germany in the year 1798, and soon outstripped all others. This was the *Allgemeine Zeitung*, or Universal Gazette, established by Cotta, a bookseller in Tübingen, and destined to become an important political organ. The *Allgemeine Zeitung* is now published at Augsburg. In all the countries of Europe it has correspondents, who supply it with intelligence; and both the German and foreign governments frequently make use of it to influence public opinion by demi-official articles. This has been done with much dexterity by the Austrian government, especially in its transactions respecting paper money and the public stocks; and even the French ministry have, it is said, occasionally made use of it for similar purposes. But with all these advantages, the sale is small, not exceeding 2000 or 2500, and barely covers the expenses. The deliverance of Germany in the year 1813 gave rise to a number of political papers, all imbued with the awakened spirit of the times. Kotzebue and Niebuhr each commenced a journal of this description; but both were soon discontinued. The most celebrated gazette of this period was the *Rheinische Merkur* of Görres, which appeared in January 1814, and terminated its career in the beginning of 1816. The *Oestereichische Beobachter*, or Austrian Observer, was established by the private secretary of Prince Metternich, and, as the official organ of the cabinet of Vienna, it speedily acquired a considerable circulation. The

German papers of amusement originated with the *Zeitung für die Elegante Welt*, which was established at Leipzig in 1801. The number of papers of this description has since been constantly increasing, although many of them have perished as rapidly as they arose. But of those which have maintained their ground, the most important are, the *Morgenblatt* of Stuttgart, the *Abendzeitung* of Dresden, the *Gesellschafter* of Berlin, and the *Litterarische Wochenblatt*, established by Kotzebue. Of all these, however, the *Morgenblatt* has the greatest sale.

Italy, Spain, and Portugal, present little worthy of notice as respects the newspaper press. Of the Italian journals, of Italy, the *Gazetta di Firenze*, the *Gazetta di Milano*, and the *Diario di Roma*, are almost the only ones which are read in foreign countries. The *Giornale Arcadico di Roma* embraces literature, the fine arts, and miscellaneous subjects, and the *Eco di Milano* endeavours to keep up a literary intercourse between Italy and other countries. The *Gaceta* of Madrid has a semi-official character, but in other respects is undeserving of notice. Lisbon has also its organ for the publication of official documents and communications. In Belgium and Holland there are, in French and Dutch respectively, a considerable number of daily and weekly papers, besides monthly publications. In 1830 Switzerland had twenty-four weekly papers, and five others which appeared once a fortnight. The first Russian paper was published in 1703, under Peter I. In 1829 the number of papers and periodicals published in the Russian empire was seventy-three; but the only important political journals are the *Gazette de St Petersburg* and the *Journal de St Petersburg*, both of which are written in the French language. In Sweden there is not much opposition nor independence amongst the newspapers, and political discussion is at a very low ebb. An interesting account of the Norwegian journals will be found in Laing's Residence in Norway, to which the reader is referred. Denmark has about eighty journals, of which twenty-three are devoted to politics, and twenty-five to the sciences.

The Greeks have now several newspapers in their own Greek and language, though none of them exerts any considerable influence, or has a numerous subscription. A journal is also published at Corfu. In Smyrna the *Spectateur Oriental* was in 1827 displaced by the *Observateur Impartial*, and subsequently by the *Courrier de Smyrne*, which is conducted in a spirit friendly to the sultan. At Constantinople the *Moniteur Ottoman* is published in French under the sanction of the sultan; and the viceroy of Egypt has likewise his official organ, in the same language, printed at Boulak, near Cairo.

The increase of newspapers in the United States has been much more rapid than in England. The total number of newspapers annually issued in the Union has been estimated at from 55,000,000 to 60,000,000, whereas the total number issued in Great Britain and Ireland during the year 1833 was only 34,515,221. It follows that, making allowance for the difference of population, every individual in America has, at an average, more than twice the supply of newspapers enjoyed by each person in England. From the low price of the American, as compared with the English and even the French newspapers, they are liberally patronised by all classes, and are to be seen in almost every dwelling and counting-house, and in all hotels, taverns, and shops. But we must not estimate the value nor the influence of newspapers by their quantity alone. Regard must likewise be had to its quality, which indeed is the principal consideration to be attended to. But in whatever degree the American may exceed the English or French journals in number, they sink immeasurably below them in point of quality. In the United States the state of the newspaper press is such that it can scarcely descend lower; indeed it may be considered as a disgrace

Newspapers.

to the country. These journals, with but few exceptions, indulge in the most offensive, and often brutal personalities. Instead of examining the principles of measures, they assail the character and misrepresent the motives of those by whom they are introduced; and, in fact, it would be difficult to name an individual of any distinction who has not been libelled and calumniated by a large portion of the press, to a degree which can scarcely be imagined. The magnitude of the evil, however, will in all probability lead to its cure. It can scarcely be supposed that an intelligent and well-instructed people will long continue to patronise a press which traffics in misrepresentation, scurrility, and exaggeration, and which, besides the outrages it commits against individuals, opposes a serious obstacle to wise government and well-considered improvement.

From the immense number of newspapers circulated in the United States, as compared with the population of the country, it follows that the number of subscribers to each paper must be limited; indeed 2000 is considered as a respectable list. The consequence is, that one paper is unable to command the talents of several able men, as in France, and that, in the general scramble, the object is rather to flatter the known prejudices, and minister to the bad passions of the people, than to enlighten their understandings by inculcating sound principles, or enforcing salutary truths. Their abundance, however, happily neutralises their effects. Declamation and sophistry are rendered comparatively innocuous by running in a thousand conflicting currents. But the case would be very different, and the evil altogether intolerable, if there were in the United States only a few papers, with from 25,000 to 30,000 subscribers, and perhaps five times as many readers. Upon such a supposition, journalism would be as influential in America as in France, and in its effects ten times more dangerous. To show the progressive extension of the American newspaper press, it is only necessary to state, that at the commencement of the revolutionary war in 1775, the number of newspapers published in the United States was only thirty-seven; that in 1810 it had increased to 359; that in 1828 it exceeded 850; and that in 1834 it amounted to no less than 1265. At this time the number of daily papers published within the Union was ninety, and that of other periodical journals 130.

Comparative estimate.

A comparison of the number of periodicals and inhabitants of different countries, made in the year 1827, gave the following results. At that time there appeared in the United States upwards of 800 journals to 11,600,000 inhabitants; in Great Britain, 483 different newspapers to 23,400,000 inhabitants; in Sweden and Norway, eighty-two journals to 3,866,000 inhabitants; in Denmark, eighty journals to 1,950,000 inhabitants; in Prussia, 288 journals to 12,416,000 inhabitants; in the Netherlands, 150 journals to 6,143,000 inhabitants; in the German confederation, exclusive of both Austria and Prussia, 305 journals to 13,300,000 inhabitants; in Saxony, fifty-four newspapers to 1,400,000 inhabitants; in Hanover, sixteen newspapers to 1,550,000 inhabitants; in Bavaria, forty-eight newspapers to 3,960,000 inhabitants; and in France, 490 periodical publications of all kinds to a population of about 32,000,000. A comparison of the number of periodicals and inhabitants in different capitals gives results scarcely less varied. Thus, Stockholm, with 38,000 inhabitants, has thirty journals; Rome, with 154,000, has only three; Berlin, with 221,000, has fifty-three periodical works; Copenhagen, with 109,000 inhabitants, has fifty-seven journals; and in Paris, which contains a population of nearly 900,000, there are 176 periodical works. Since the date to which this comparison refers, however, the numbers in both respects must have varied considerably; but it is probable that the relative proportions remain pretty nearly the same. It may also be observed, that no general conclusion as to the state

of intellectual culture or of political information amongst a people can safely be deduced from such comparative positions as that which is above given. The proportional number of journals circulated in the United States is much greater than in any other country; yet, as we have already shown, they are the most worthless, and consequently the least calculated to diffuse useful knowledge, or to excite a spirit of inquiry, of any in the world.

Much has been said both as to the absolute and the comparative effects, moral and political, produced by newspapers, in those countries where they are freely circulated; and there is room for considerable diversity of opinion respecting the degree and the kind of influence which they exert upon the sentiments and opinions of the public. But that this influence must be considerable, in whatever mode or direction it may operate in particular cases, or under peculiar circumstances, there can be no doubt at all, even amongst those who differ most widely as to its real character and effects. It will of course vary according to the relative condition of different classes or communities in point of information; but the joint effect and full result of its continual appliance can scarcely fail to be very considerable, even where its action is least concentrated. The power of the newspaper press depends, not on single and disjointed impulsions, but on the aggregate effects of constantly reiterated action; it is a practical exemplification of the proverb, that the drop hollows the stone, *non vi sed sæpe cadendo*. All experience shows, that any agency or force, however small, if continually applied in the same direction, and towards the same object or objects, will in course of time produce the greatest results. Still, in different countries, variously circumstanced in point of education and general information, considerable diversity may be observed in the operation of this power, and in the mode in which it attains its ultimate effect upon the public mind. Where the mass of the people are comparatively enlightened, and more or less habituated to reflection, the press, in order eventually to govern, must begin by following the current of opinion. It cannot stem, but it may divert, the stream; it must not begin by opposing a direct resistance, but by skill and address it may ultimately succeed in turning it into a new channel, and in some measure governing it at pleasure. In such cases, there is both action and re-action. Public opinion acts upon the press, and the press re-acts upon public opinion, with an accumulating force, of which, in certain circumstances, it is difficult to exaggerate the extent and the power. But it is otherwise in countries where the mass of the people are comparatively unenlightened, and unaccustomed to form an independent judgment amidst the conflict of antagonist opinions. There the press is a real and direct power, which acts at once on the public mind, and which, if left to act uncontrolled, may eventually produce the most baneful, not to say fatal, impressions. In the former case, there is a check in the pre-existent condition of society; in the latter, there is none whatever, except that which may happen to be applied by the law.

From an elaborate calculation made in the year 1819, it was inferred that, including the provincial journals, an Englishman reads daily twenty or thirty times as much as a Frenchman does of the newspapers of his country. This calculation may have been exaggerated, and the disparity is probably much less now than it was eighteen years ago; but it is nevertheless evident that the balance of the newspaper reading, all kinds of journals included, is still on the side of the Englishman, who, again, is exceeded in this respect by the North-American. Yet, in France, the journals exert a much more direct influence upon public opinion than either in England or in America. They constitute a sort of power in the state, which is altogether irresponsible within the limits prescribed by the law, that is, in its

Newspapers.

Newspapers.

ordinary exercise; and they give the tone to the sentiments and opinions of the nation. They are not so much mirrors which reflect the state of the public mind, as agencies which impart to it whatever bias or tendency they please. Journalism in that country is therefore seen under a different aspect from that in which it appears in almost any other; and hence it has been an object of constant vigilance and suspicion on the part of the general government. But if its influence be greater in France than elsewhere, that influence has also been more contested. From its birth, as it displayed a tendency to absorb every thing, so nothing was granted to it without a struggle. No power has ever excited more alarm, has had more enemies, has survived severer trials, or has undergone more singular revolutions. From 1789 to 1830, the ordinary condition of the French press was a rule of censorship and oppression; the rare intervals of liberty vouchsafed to it only served as moments of rest to take breath in that adventurous campaign, every advance in which was won by hard fighting. Yet the power of the press has grown amidst these trials; the bonds which were imposed upon it to check its movement have fortified its strength, and it is now a sort of dictatorship in the state. The existence of this extraordinary power is accounted for by the circumstances of the country. In Great Britain, and in the United States, where a representative government is firmly established, each political power occupies its natural place, without transgressing the limits of its proper sphere of action. The press does not invade the province of the legislative chambers, nor do the latter encroach upon the domain of the press. But in France the government is still at a stage of experiment and difficulty; it alternately looks back to the past, and forward to the future, seeking its equilibrium and its point of rest. The time is not yet come for it peaceably to work out its established principle, because that principle is still a matter of doubt and debate; and as long as this experimental state of things shall continue, the constituted powers will have only a secondary importance, and the press, which takes the lead and opens the road to discovery, will necessarily govern the country. But, in a country like Great Britain, where the great body of the people are possessed of information, and the habit of political discussion has long been formed and matured; where the conflicts of party enter as an essential element into the practical working of the constitution, and there exists a steady independent opinion, upon which violence and exaggeration are powerless, except in periods of great public excitement; the press is rather an exponent or index of the feelings, sentiments, and opinions of the people, than a controlling or governing power, assuming the form of a dictatorship, and really constituting an *imperium in imperio*, as in France. The whole action of government is concentrated in the houses of parliament and in the hands of the administration; and the press is restricted to its proper function, namely, the criticism of events and of public opinions. The people, too, are trained and habituated to this state of things. They are not the slaves, but the patrons, and even the critics, of the press; nor are their minds primarily moved by its speculations, commentaries, and arguments, directed, as these generally are, towards the support of some particular set of opinions. Party journals are for the most part read as such, and the statements or reasonings of one set of writers are coolly compared with those of another. There is nothing, or next to nothing, of that undoubting faith, or that blind credulity, which leads men to believe merely because it is written. Even the warmest partisan will not submit his understanding to the exclusive guidance of the writer whom, perhaps, he in general most admires and approves of; and hence the best safeguard against the abuse of free discussion, or the licentiousness of the press, is to be found in the inherent sta-

bility of our institutions, and the sense, intelligence, and morality of the people. Newton.

(See Chalmers' *Life of Ruddiman*; *Periodical Press of Great Britain*; *Babylon the Great*; *The Great Metropolis*; M'Culloch's *Commercial Dictionary and Supplement*, 1836 and 1837; *Le Compilateur*; Girardin, *Moyens Legislatifs pour régénérer la Presse*, 1835; *Encyclopædia Americana*, article NEWSPAPERS; the *American Almanac* for 1835; *La Chronique Suisse*; *Swedish Language and Literature*; *Statistique et Itinéraire de la Russie*; *Edinburgh Review*, vols. xxxii. and xxxviii.; *British and Foreign Review*, No. xiii. April 1837.) (A.)

NEWTON, a borough and market town of the county of Lancaster, in the parish of Winwick and the hundred of West Derby, distant 193 miles from London. It consists principally of one broad street, with many antiquated buildings, and is celebrated for the number of public houses it contains. It formerly returned two members to parliament. It has some trade in cotton goods. The population amounted in 1821 to 1643, and in 1831 to 2139.

NEWTON, a town in the Isle of Wight, within the parish of Colbourn, which formerly returned two members to the House of Commons, but has been disfranchised. It has a good harbour, which, however, is but little resorted to.

NEWTON, a market-town of the county of Montgomery, in South Wales, distant 178 miles from London, and sometimes called Trenewydd. It is situated in a pleasant and fertile district on the banks of the Severn. It shares with Montgomery and four other towns the right of electing one member to the House of Commons. It has a market, which is held on Saturday. The population amounted in 1801 to 990, in 1811 to 2025, in 1821 to 3486, and in 1831 to 4550.

NEWTON-BUSHEL, a town of the county of Devon, 187 miles distant from London. It is situated on the river Teign, about four miles from its mouth, in Torbay. There is a market, which is held on Wednesday. As it is composed of portions of two parishes, the population of the town in the last census is not distinguished from that of the parishes.

NEWTON, SIR ISAAC, a distinguished mathematician and natural philosopher, was born at Woolsthorpe, a picturesque hamlet about half a mile to the west of Colsterworth, in Lincolnshire, and some six miles to the south of Grantham. His birth, which was premature, took place on the 25th of December, O. S. 1642. His father, Mr Isaac Newton, was proprietor of Woolsthorpe to the extent of about L.30 per annum, and farmed it with his own hands. His mother was Harriet Ayscough, the daughter of Mr James Ayscough, of Market-Overton, in Rutlandshire. They had been married only a few months when Mr Newton died, leaving his wife in a state of pregnancy. The posthumous child was so small that "they might have put him into a quart mug," and no expectation was entertained of his continuing to live. "Providence, however," as his biographer observes, "had otherwise decreed; and that frail tenement, which seemed scarcely able to imprison its immortal mind, was destined to enjoy a vigorous maturity, and to survive even the average term of human existence." Mrs Newton possessed a small property in Leicestershire, about three miles from Woolsthorpe, which raised her annual income to about L.80.

In consequence of the marriage of Mrs Newton to the Rev. Mr Smith of North Witham, she left her son Isaac under the charge of her mother. He received his early education at two day schools at Skedington and Stoke; and in his twelfth year he went to the public school at Grantham, taught by Mr Stokes, and was boarded at the house of Mr Clark, an apothecary. Here his attention was less occupied with his studies than with the mechanical amusements, in which he spent all his leisure hours. Mo-

Newton. dels of wind-mills, water-clocks, and self-moving carriages, were executed by him in succession; and he contrived to amuse his schoolfellows with paper kites and paper lanterns, which he raised to great heights in the air.

From the play-things of his childhood, Newton made a rapid transition to higher amusements. The daily movements of the sun were traced upon the walls and roofs of the buildings at Woolsthorpe, and by means of pins and lines he indicated the hours and half hours of his rude dials; and though he was now employed in tending the cattle, and going to the market at Grantham, yet he was often found studying mathematics under a hedge, or glean- ing fragments of science from old books in Mr Clark's garret at Grantham. This inattention to the duties of the farm increased with his years, and his mother came to the resolution of giving him an academical education. After the preparation of a few months at Grantham School, he was sent to Cambridge, where he was admitted of Trinity College on the 5th of June 1660, in the eighteenth year of his age. He was admitted a subsizer in 1661, a bachelor of arts in 1665, a junior fellow in 1667, and master of arts in 1668. Young Newton's attention was first turned to the study of mathematics by a passion for judicial astrology. He considered the propositions in Euclid as self-evident truths; and in the geometry of Descartes, the Miscellanies of Schooten, the *Clavis* of Oughtred, and the Arithmetic of Infinites of Wallis, he acquired his first knowledge of the mathematics. Kepler's Optics and Saunderson's Logic were amongst the books which he carefully studied, and upon which he wrote comments; and so rapid was his progress in knowledge, that he was considered as being more deeply versed in several branches than his own tutor. In the year 1664 he purchased a prism for the purpose of studying Descartes' Theory of Colours; but he does not seem to have made any special use of it. In 1666 he purchased another prism; and early in 1668 three additional prisms, which were no doubt those which he used in his experiments. He had in 1666 applied himself to the grinding of "optic glasses of other figures than spherical;" and finding that there were other causes than the imperfect converging of rays to a focus which rendered refracting telescopes imperfect, he was led to inquire into the cause of the colours produced by lenses and prisms, and to make those splendid discoveries respecting the different refrangibility of the rays of light, the history and nature of which has been given in the article on OPTICS.

Having despaired of improving the refracting telescope, Newton directed his attention to the reflecting one. At this time Gregory's *Optica Promota*, published in 1663, fell into his hands; and, in considering the construction of the Gregorian telescopes there described, "he found the disadvantages of them so great," "that he altered the design of them, and placed the eye-glass at the side of the tube rather than at the middle." On this altered principle he executed a reflecting telescope with his own hands in the year 1668. In 1671 he executed a better one, which was shown to the king, and presented to the Royal Society, in whose custody it still remains.

Although Newton delivered a course of lectures on optics in Cambridge in 1669, 1670, and 1671, containing an account of his discoveries respecting the different refrangibility of the rays of light, yet the Royal Society was not acquainted with them till 1672. On the 23d of December 1671, he was proposed as a member of that body by Dr Seth Ward, bishop of Sarum, and he was elected on the 11th of January 1672. On the 6th of February he communicated to Mr Oldenburg his discoveries respecting light, which he regarded as "the oddest, if not the most consi-

derable, detection which had hitherto been made in the operations of nature."

No sooner was it communicated to the world that *white* light consists of seven different colours, having different degrees of refrangibility, than a crowd of obscure individuals assailed, not only his conclusions, but the accuracy of the experiments from which they had been derived. Dr Hooke and Huygens attacked them on different grounds; but Newton, in a letter to Oldenburg, dated the 11th of June 1672, silenced the arguments of his opponents, and established his general doctrine upon an impregnable basis.

The colours of thin plates, first observed by Boyle, and studied by Hooke, had occupied the special attention of Newton. The results of his inquiries were laid before the Royal Society on the 7th of December 1675, and about twelve years afterwards the theory of fits was completed, and applied to the explanation of the permanent colours of natural bodies. These researches, however, including his experiments on the inflexion of light, which he gives only as an imperfect fragment, were not published till 1704, when his treatise on Optics appeared. For a full account of these discoveries the reader is referred to the article OPTICS.

The first idea of gravity as the cause of the celestial motions occurred to Newton in the year 1666, when sitting alone in the garden of Woolsthorpe. Conjecturing that it might extend as far as the moon, he was led to confirm the conjecture by calculation, and thus to establish the doctrine of universal gravitation, "that every particle of matter is attracted by, or gravitates to, every other particle of matter, with a force inversely proportional to the squares of the distance." This great discovery, and its application to the movements of the planetary system, as well as to that of the comets, was published in 1686, in his *Philosophiæ Naturalis Principia Mathematica*, a work which, to use the words of Newton's biographer, "is memorable, not only in the annals of one science or one country, but will form an epoch in the history of the world, and will ever be regarded as the brightest page in the records of human reason." This remarkable production was speedily circulated over Europe; and although the discoveries which it contained were for a while opposed by national as well as personal jealousies, yet the Newtonian philosophy made rapid progress, and finally supplanted the rival systems of Aristotle and Descartes.

As early as the year 1666, Newton had discovered the binomial theorem and the method of fluxions; and although he had not communicated this discovery to any of his friends, yet he had clearly described the principle, and exhibited the application of his method, in his *Analysis per Equationes numero Terminorum infinitas*, a work which he had communicated to Dr Barrow in June 1669, and which was not published till 1701, nearly half a century after it was written. Our readers are well aware that the discovery of fluxions was claimed by Leibnitz, and that the controversy which sprung out of this claim is scarcely yet at an end.¹

From the year 1669, when Newton was appointed to succeed Dr Barrow as Lucasian professor of mathematics at Cambridge, till 1688, he led a secluded life within the walls of his college; but events now occurred which drew him from retirement, and placed him conspicuously on the stage of public life. James II., desirous of re-establishing the Catholic faith as the national religion, had begun to assail the privileges of his Protestant subjects. He ordered Father Francis, an ignorant Benedictine monk, to be received at Cambridge as a master of arts, and the oaths of allegiance and supremacy to be dispensed with. The university resisted this illegal mandate, and chose

¹ A full account of this controversy will be found in the article FLUXIONS, vol. ix. p. 633; and LEIBNITZ, vol. xiii. p. 208.

Newton. nine delegates to defend their independence. Having joined in resisting the wishes of the court, Newton was chosen one of the delegates; and such was their firmness, and the argumentative weight of their representations, that the king was led to abandon his design. Newton's popularity was extended by the success of the delegates, and he was elected member for the university in 1688, along with Sir Robert Sawyer, having beaten Mr Finch by only five votes. Newton sat in the convention parliament from January 1689 till its dissolution in February 1690.

In the discharge of his parliamentary duties, he no doubt experienced the unsuitableness of his income to his new position. The limited means of his relations, and his own generous disposition, had exhausted his scanty resources, and he and his friends naturally looked to some patronage on the part of the government which might enable him to pursue his scientific researches, unembarrassed by those physical wants which have ever been the scourge of genius, and especially of that variety of it which is called forth by patient and continuous inquiry. There is ample evidence that unsuccessful applications had been made for this purpose, and the vexation and disappointment which this ingratitude produced, combined with other causes, seem to have thrown Newton into a state of nervous irritability, which threatened to paralyze even his mighty intellect. It is difficult to trace with distinctness the succession of causes which at this time contributed to disturb his serenity; but it appears that, about the end of 1692, or early in 1693, his chemical laboratory had been burned, and a number of manuscripts destroyed; and on another occasion, several valuable manuscripts were consumed by a candle which he had left burning whilst he went to chapel. These losses seem to have affected him deeply, and "he was so troubled thereat, that every one thought he would have run mad, and he was not himself for months after." Another account of these events, communicated by one Colin or Collins to Huygens,¹ represents Newton as having actually become insane, and unable to understand his own writings; and, relying upon the accuracy of this statement, M. Biot and other French philosophers considered his insanity as the reason why Newton had ceased to make scientific discoveries. They even went so far as to ascribe his study of theology to this enfeebled state of mind, and thus to deprive our faith of that support which it derived from having been illustrated and defended by so great an expositor and champion.

That the mind of Newton was sound and active during the period when it is said to have been seriously disturbed, may be proved by many undoubted facts. In this interval he composed his four celebrated letters to Dr Bentley on the existence of a Deity; letters which evince a power of thought, and a serenity of mind, incompatible

even with the slightest obscuration of his faculties. The first of these letters was written on the 10th of December 1692, the second on the 17th of January 1692-3, the third on the 25th of February, and the fourth on the 11th of February 1693-4. In 1692 we find him also engaged in mathematical researches on the quadrature of curves, and in observations on halos; and in November and December 1693 he was occupied in discussing mathematical questions with his correspondents. On the 1st of September 1694 Newton visited Flamsteed at Greenwich, and he was at that time occupied with the difficult and profound subject of the lunar theory.²

That Newton's health was affected from the middle of 1692 to the middle of 1693, is quite certain; and that his nervous system was shaken by loss of sleep and appetite, is mentioned by himself. Exaggerated rumours had reached his friends in London, and Mr Pepys was led to inquire of his friends at Cambridge if these rumours of a discomposure of his mind had any foundation. Mr J. Millington, who, we believe, was tutor of Magdalene College, returned the following answer:—"I was, I must confess, very much surprised at the inquiry you were pleased to make by your nephew about the message that Mr Newton made the ground of his letter to you, for I was very sure I never either received from you or delivered to him any such; and therefore I went immediately to wait upon him, with a design to discourse with him about the matter; but he was out of town, and since I have not seen him, till, upon the 28th, I met him at Huntingdon, where, upon his own accord, and before I had time to ask him any question, he told me that he had writt to you a very odd letter, at which he was much concerned; added, that it was in a distemper that much seized his head, and that kept him awake for about five nights together, which upon occasion he desired I would represent to you, and beg your pardon, he being very much ashamed he should be so rude to a person for whom he hath so great an honour. He is now very well, and though I fear he is under some small degree of melancholy, yet I think there is no reason to suspect it hath at all touched his understanding, and I hope never will; and so I am sure all ought to wish that love learning, or the honour of our nation, *which it is a sign how much it is looked after*, WHEN SUCH A PERSON AS MR NEWTON LYES NEGLECTED BY THOSE IN POWER."

In the beginning of the year 1692, Charles Montague, Lord Monmouth, and Mr Locke, were exerting themselves to obtain some appointment for Newton. In his letters to Locke, Newton himself refers, with a considerable degree of feeling, to these exertions. He conceived that Charles Montague, under the influence of some old grudge, had been false to him, and that there had been a design to sell

¹ The following extract from the manuscript of Huygens was first published in Biot's Life of Newton. "On the 29th of May 1694, M. Colin (*Collins* or *Colm*), a Scotsman, informed me that, eighteen months ago, the illustrious geometer Isaac Newton had become insane, either in consequence of his too intense application to his studies, or from excessive grief at having lost by fire his chemical laboratory, and several manuscripts. When he came to the Archbishop of Cambridge, he made some observations which indicated an alienation of mind. He was immediately taken care of by his friends, who confined him to his home, and applied remedies, by means of which he had now so far recovered his health that he began to understand the *Principia*."

The following extract from a manuscript journal kept by Mr Abraham de la Pryme, an ancestor of Professor Pryme, when a student at Cambridge, throws much light on this part of Newton's life. "1692, Feb. 3. What I heard to-day I must relate. There is one Mr Newton (whom I have very often seen), fellow of Trinity College, that is mightily famous for his learning, being a most excellent mathematician, philosopher, divine, &c. He has been fellow of the Royal Society these many years; and, amongst many other very learned books and tracts, he has written one upon the mathematical principles of philosophy, which has got him a mighty name, he having received, especially from Scotland, abundance of congratulatory letters for the same. But of all the books which he ever wrote, there was one of *Colours and Light*, established upon thousands of experiments, which he had been twenty years of making, and which had cost him many hundreds of pounds. This book, which he valued so much, and which was so much talked of, had the ill luck to perish and be utterly lost, just when the learned author was almost at putting a conclusion to the same, after this manner. In a winter's morning leaving it among his other papers on his study table, whilst he went to chapel, the candle, which he unfortunately left burning there too, caught hold by some means of other papers, and they fired the aforesaid book and utterly consumed it, and several other valuable writings; and, which is most wonderful, did no further mischief. But when Mr Newton came from chapel, and had seen what was done, every one thought he would have run mad; he was so troubled thereat, that he was not himself for a month after." (Brewster's Life of Newton, p. 228.)

Baily's Account of the Life of Flamsteed, p. 61, 133.

Newton. him an office; and it is to the failure of these attempts that Mr Millington alludes with such just severity in the letter which we have quoted.

Newton was now in the fifty-third year of his age; and whilst those of his own standing at the university had been appointed to high stations in the church, or to lucrative offices in the state, he still remained without any mark of national gratitude. His fellow-labourers in science in every part of Europe were enjoying the favour and protection of their respective sovereigns, who had even invited foreign philosophers to their capitals to enjoy the liberality which they had extended to their own. Foreigners viewed with astonishment the treatment of Newton by his own sovereign, and the French king had the nobleness of mind to offer him, through Cassini, a liberal pension.

But this blot upon the English name was at last removed by Charles Montague, when, in the year 1694, he was appointed chancellor of the exchequer. He had previously consulted Mr Newton upon the subject of the recoinage; and when Mr Overton, the warden of the mint, was made a commissioner of customs, he served both his friend and his country by appointing Newton to that important office. "I am very glad," says he, "that at last I can give you a good proof of my friendship, and the esteem the king has of your merits. Mr Overton, the warden of the mint, is made one of the commissioners of the customs, and the king has promised me to make Mr Newton warden of the mint. The office is the most proper for you. 'Tis the chief office in the mint; 'tis worth five or six hundred pounds per annum, and has not too much business to require more attendance than you can spare."

The chemical and mathematical knowledge of Newton proved of great use in carrying on the recoinage, which was completed in about two years; and such was the zeal and devotion with which Newton discharged the laborious duties of this office, that he was appointed, in 1697, to the mastership of the mint, which was worth between twelve and fifteen hundred pounds per annum. In this situation he drew up a table of assays of foreign coins, and composed an official report on the coinage. Having retained his professorship at Cambridge whilst he was warden, he now appointed Mr Whiston as his deputy, with all the emoluments of the chair.

In the same year Newton was elected a foreign associate of the Royal Academy of Sciences at Paris. In 1701 he was elected one of the members of parliament for the University of Cambridge. In 1703 he was raised to the presidency of the Royal Society of London, to which he was annually re-elected during the remaining twenty-five years of his life.

When Queen Anne and the court visited Cambridge on the 16th of April 1705, she conferred the honour of knighthood on Mr Newton.

On the dissolution of parliament in 1705, Sir Isaac was again a candidate for the representation of the university; but he was beaten by a great majority. He was supported by all the resident members; but being a whig in politics, and the cry of the church in danger having been raised on that occasion, he became the victim of the ignorance and fanaticism of the non-resident constituency.

The first edition of the *Principia* having been sold off, Dr Bentley and his other friends had, for a considerable time, been urging Sir Isaac to prepare a new edition. The duties of the mint would not permit him to devote much time to such a task; but he willingly complied with the request of his friends, when Mr Roger Cotes, Plumian professor of astronomy at Cambridge, undertook to superintend its publication. Newton promised to send his own revised copy to Mr Cotes in July 1709; but delays took place, and the work was not completed till the spring of

1713. Nearly three hundred letters passed between Sir Isaac and Cotes, in which the various alterations and additions are discussed; and this correspondence, at least the letters of Newton to Cotes, has been carefully preserved in the library of Trinity College, Cambridge.

When George I. succeeded to the throne of Great Britain, Sir Isaac became an object of interest at court. The Princess of Wales, afterwards queen-consort to George II. took great pleasure in conversing with him, and in corresponding with Leibnitz. Having one day mentioned to her royal highness a new system of chronology which he had composed whilst resident at Cambridge, she requested Sir Isaac, through the Abbé Conti, to give her a copy of it. He accordingly drew up an abstract of it from the loose papers to which it had been committed, and sent it to the princess for her private use alone. He afterwards allowed a copy to be given to the Abbé Conti, on the condition of its not being communicated to any person whatever. The abbé, however, forgetting his obligation, communicated it to M. Fréret, a learned antiquary in Paris, who translated it, and endeavoured to refute it. It was printed early in 1725, under the title of *Abrégé de Chronologie de M. le Chevalier Newton, fait par lui-même, et traduit sur le Manuscrit Anglais*. Upon receiving a copy of this work, Sir Isaac Newton printed, in the Philosophical Transactions for 1725, a paper, entitled Remarks on the Observations made on a Chronological Index of Sir Isaac Newton, translated into French by the observer, and published at Paris. In these remarks Sir Isaac charges the abbé with a breach of promise, and gave a triumphant answer to the objections which Fréret had urged against his system. Father Souciet entered the field in defence of Fréret; and, in consequence of this controversy, Sir Isaac was induced to prepare his larger work, which was published in 1728, after his death, and entitled the Chronology of Ancient Kingdoms amended; to which is prefixed, a short Chronicle from the First Memory of Kings in Europe to the conquest of Persia by Alexander the Great.

There is no part of Sir Isaac Newton's biography more remarkable than that which relates to his theological studies. From a very early period of his life Newton had seriously embarked in the study of theology. Previously to 1692 he was known by the appellation of an excellent divine, and it is well known that he had begun to study the subject of the prophecies before 1690; whereas, in order to show that his theological writings were the productions of his dotage, and subject to his supposed mental alienation, M. Biot has fixed their date between 1712 and 1719, between the seventieth and the seventy-fifth year of his age.

One of the most remarkable of Sir Isaac's theological productions is his Historical Account of Two Notable Corruptions of the Scripture, in a letter to a friend. This friend was Mr Locke, who received the letter in November 1690. Sir Isaac seems to have been then anxious for its publication; but as the effect of his argument was to deprive the Trinitarians of two passages in favour of the Trinity, he became alarmed at the probable consequences of such a step. He therefore requested Locke, who was then going to Holland, to get it translated into French, and published on the Continent. Being prevented from going to Holland, Locke copied the manuscript, and sent it, without Newton's name, to M. le Clerc, who received it before the 11th of April 1691. On the 20th of January 1692, Le Clerc announced to Locke his intention to publish the pamphlet in Latin; and upon intimating this to Sir Isaac, he entreated him "to stop the translation and impression as soon as he could, for he designed to suppress them." This was accordingly done; but Le Clerc sent the manuscript to the library of the Remonstrants, and it was afterwards

Newton. published at London in 1754, under the title of Two Letters from Sir Isaac Newton to M. le Clerc. This edition is imperfect, and in many places erroneous; and Dr Horsley has published a genuine one, which is in the form of a single letter to a friend, and was taken from a manuscript in Sir Isaac's own hand, in the possession of the Reverend Dr Ekins, dean of Carlisle.¹

Sir Isaac Newton left behind him in manuscript a work entitled Observations on the Prophecies of Daniel and the Apocalypse of St John, which was published in London in 1733, in one volume 4to; another work entitled *Lexicon Propheticum*, with a dissertation on the sacred cubit of the Jews, which were printed in 1737; and Four Letters addressed to Dr Bentley, containing some arguments in proof of a Deity, which were published by Mr Cumberland, the nephew of Dr Bentley, in 1756.² Sir Isaac composed some other theological manuscripts which have not been published.

Sir Isaac Newton devoted much of his time to the study of chemistry; but the greater number of his experiments still remain in manuscript. His *Tabula Quantitatum et Graduum Caloris* contains a comparative scale of temperature from that of melting ice to that of a small kitchen coal fire. He wrote also another chemical paper, *De Natura Acidorum*, which has been published by Dr Horsley. Sir Isaac spent much time in the study of the writings of the alchemists; and the Rev. Mr Law informs us, that he had diligently studied the writings of Jacob Behmen, and that there were found amongst Sir Isaac's manuscripts copious abstracts from them in his own handwriting. He states also, that in the earlier part of his life he and his relation Dr Newton of Grantham had put up furnaces and had wrought for several months in quest of the philosopher's tincture. These views are rendered more probable by the fact, that in the list of Newton's manuscripts published by Dr Hutton, and in the possession of the Earl of Portsmouth, there are many sheets in Sir Isaac's hand, of Flamsteed's Explication of Hieroglyphic Figures, and in another hand many sheets of William Yworth's *Processus Mysteriorum Magni Philosophici*.

Amongst the inventions of Sir Isaac Newton we must enumerate his reflecting telescope, his reflecting microscope, a sextant similar to Hadley's, and his prismatic reflector, with plane and convex surfaces. We owe also to him some very interesting views on the decussation of the optic nerves, which were first published in Harris's Optics; a hypothesis respecting ether as the cause of light and gravity; and some experiments upon the excitation of electricity on glass.³

The sale of the second edition of the *Principia* having been rapid, a third edition was called for in 1722. Roger Cotes had died in the prime of life, and therefore Newton engaged Dr Pemberton to superintend the new edition, which was published in 1726, with numerous alterations.

During the last twenty years of Sir Isaac's life, his beautiful and accomplished niece, Miss Catherine Barton, had managed his domestic concerns. She was the daughter of Mr Robert Barton of Brigstock, and of Hannah Smith, Newton's half sister. She had been a great favourite of Charles Montague, earl of Halifax, who, at his death in 1715, bequeathed to her a very large portion of his fortune. This lady, who had been educated at Sir Isaac's expense, married Mr Conduit, and continued to reside with her husband in Sir Isaac's house until the time of his death.

In the year 1722, when he was eighty years old, he had been seized with an incontinence of urine, which was ascribed

to stone. By great attention to diet and regimen he succeeded in keeping down this dreadful malady; but in 1724 he passed a small stone, and for some months enjoyed a tolerable degree of health. In January 1725 he was seized with a violent cough and inflammation of the lungs, which induced him to reside at Kensington; and in the February of the same year he had a fit of gout both in his feet and hands, which produced a decided improvement in his general health. His duties at the Mint were discharged by Mr Conduit, and he therefore seldom went to London. Feeling himself well, he went to London on the 28th of February 1728, to preside at a meeting of the Royal Society; but the fatigue which attended this duty brought on a violent return of his former complaint, and he returned to Kensington on the 4th of March, when Dr Mead and Dr Chesselden pronounced his disease to be stone. He endured the sufferings of this complaint with wonderful patience and meekness. He seemed a little better on the 15th of March, and on the 18th he read the newspapers and conversed with Dr Mead; but at six o'clock in the evening he became insensible, and continued in that state till Monday the 20th of March, when he expired between one and two o'clock in the morning, in the eighty-fifth year of his age. His body was removed to London, and on Tuesday the 28th of March it lay in state in the Jerusalem Chamber, and was thence conveyed to Westminster Abbey, where it was buried near the entrance into the choir, on the left hand. The pall was supported by the Lord Chancellor, the Dukes of Roxburghe and Montrose, and the Earls of Pembroke, Sussex, and Macclesfield, who were fellows of the Royal Society. The Bishop of Rochester performed the funeral service. The relations who inherited his personal estate devoted L.500 to the erection of a monument to his memory. It was finished in 1731, and was erected in the centre of the abbey. The following is the epitaph inscribed upon it:

Hic situs est
Isaacus Newton, Eques auratus,
Qui animi vi prope divina
Planetarum motus, figuras,
Cometarum semitas, Oceanique Æstus
Sua Mathesi facem præferente
Primus demonstravit;
Radiumque Lucis dissimilitudines
Colorumque inde nascentium proprietates
Quas nemo antea vel suspicatus erat, pervestigavit;
Naturæ, antiquitatis, S. Scripturæ
Sedulus, sagax, fidus interpres;
Dei opt. max. majestatem philosophia asseruit;
Evangelii simplicitatem moribus expressit.
Sibi gratulentur mortales, tale tantumque extitisse,
HUMANI GENERIS DECUS
Natus xxv. Decemb. MDCXLII.; Obiit xx. Mar.
MDCCXXVII.

In the beginning of the year 1731 a medal was struck at the Tower in honour of Sir Isaac Newton, bearing the motto, *Felix cognoscere causas*; and on the 4th of February 1755 a fine full-length statue of him by Roubillac, executed in white marble, was erected in the antechapel of Trinity College, Cambridge, at the expense of Dr Robert Smith, the author of the Complete System of Optics. The pedestal bears the inscription

Qui genus humanum ingenio superavit;

an assertion which may be justly doubted, even by those who are the greatest admirers of Newton's genius.

¹ See Brewster's Life of Newton, p. 276.

² The original letters are preserved in the library of Trinity College, Cambridge.

³ *Newtoni Opera*, by Horsley, vol. iv. p. 375.

Newton.

The personal estate of Sir Isaac Newton amounted to about L.32,000. It was divided amongst his four nephews and four nieces of the half blood, the grandchildren of his mother by the Rev. Mr Smith. The family estates of Woolsthorpe and Suster were bequeathed to John Newton, whose great-grandfather was Sir Isaac's uncle, by whom they were sold in 1732 to Mr Edmund Turnor of Stoke Rocheford. Sir Isaac bequeathed his estate at Kensington to Catherine, the only daughter of Mr Conduit, who afterwards married Mr Wallop, the eldest son of Lord Ly-mington, and subsequently Earl of Portsmouth. Sir Isaac was succeeded as warden and master of the mint by his nephew, Mr Conduit, who died in 1737.

In his social character Sir Isaac Newton was modest, and candid, and affable, accommodating himself to every class of society in which he moved. His humility was that of a philosopher who had experienced both the strength and the weakness of the human mind, and of a Christian who was deeply impressed with the unsatisfying nature of all earthly greatness. "I do not know," said he, a short time before his death, "what I may appear to the world; but to myself I seem to have been only like a boy playing on the sea-shore, and diverting myself in now and then finding a smoother pebble or a prettier shell than ordinary, whilst the great ocean of truth lay all undiscovered before me." His religious and moral character were equally admirable. He was deeply versed in the knowledge of the Scriptures, and was not equalled in point of theological learning by any of the divines of his age. He was a great friend of religious toleration, and never scrupled to express his abhorrence of even the mildest species of religious persecution.

Sir Isaac Newton was remarkable for his liberality upon all occasions. His charity was boundless, and he was in the habit of remarking, that those who gave away nothing till they died never gave at all. He wrote to the Provost of Edinburgh in 1724, offering L.20 annually to Mr Mac-laurin, provided he became assistant to Mr James Gregory, professor of mathematics in the university. In 1719 he gave fifty guineas to the Rev. Mr Pound, who made some astronomical observations for his use; and in 1720 he gave him the like sum. He likewise bestowed large donations on the Ayscoughs, his relations.

In his personal appearance Sir Isaac was not above the middle size. He had "a comely and gracious aspect, and a very lively and piercing eye." He was short-sighted, but never wore spectacles, nor lost more than one tooth in his life. Bishop Atterbury asserts, in opposition to this, that the lively and piercing eye did not belong to Sir Isaac during the last twenty years of his life. "Indeed," says he, "in the whole air of his face and make there was nothing of that penetrating sagacity which appears in his compositions. He had something rather languid in his look and manner, which did not raise any good expectation in those who did not know him."

The manor-house of Woolsthorpe, as well as every other memorial of Sir Isaac, has been preserved with religious care. Mr Turnor of Stoke Rocheford, the proprietor, put up, in 1798, a white marble tablet in the room where Sir Isaac was born, recording his birth and death, and bearing the celebrated lines of Pope:

Nature and Nature's laws lay hid in Night;
God said, "Let Newton be," and all was Light.

The house still contains on its walls the two dials made by Newton himself, but without the styles. His second telescope is preserved in the library of the Royal Society; and his globe, universal ring dial, quadrant, compass, and a re-

flecting telescope said to have belonged to him, in the library of Trinity College, Cambridge.

Newton.

The manuscripts, correspondence, and other papers of Sir Isaac Newton, have been preserved in different collections. But the most important collection is the family one in the possession of the Earl of Portsmouth. They are deposited at Hursbourne Park, his lordship's seat in Hampshire, and have been very recently (in 1837) examined by H. A. Fellowes, Esq. the accomplished nephew of Lord Portsmouth, and by Sir David Brewster, who has been permitted to make use of them in composing *Memoirs of the Life, Writings, and Discoveries of Sir Isaac Newton*. In this examination much new and valuable information has been discovered relative to the early life of Sir Isaac, which had been collected by his nephew-in-law Mr Conduit, for the purpose of writing a life of him, which he was prevented from executing by his death in the year 1737. Many letters and papers of Newton are in the possession of the Earl of Macclesfield at Shirburn. They were found amongst the papers of William Jones, the friend of Sir Isaac, and the father of Sir William Jones. These papers have recently been put into the hands of Professor Rigaud of Oxford, who is now preparing them for publication.

About thirty-four of Newton's letters to Flamsteed are deposited in the library of Corpus Christi College, Oxford; but a large portion of the correspondence between Newton and Halley has recently been found by Mr Bailly in the possession of Mr Giles, a private gentleman in London, and in the Royal Observatory at Greenwich, along with various important documents intimately connected with the scientific history of that period. As the papers found in the observatory had been purchased by the Board of Longitude in 1771, the lords commissioners of the admiralty, on the recommendation of the board of visitors of the Royal Observatory, agreed to print them. They have been accordingly printed in a large quarto volume, under the superintendence of Mr Bailly.¹

Doubts have been entertained by some, and openly expressed by others, relative to the propriety of publishing all the papers contained in this collection. Several of the letters of Flamsteed, and various parts of his autobiographical memoir, contain bitter and malignant attacks upon the character and conduct of Sir Isaac Newton, which, if they had been published during his life, or not long after it, might have been refuted on the authority of documentary and other evidence which cannot now be obtained. Fortunately for the memory of Sir Isaac Newton, his generous and noble character, his meek and gentle disposition, and his Christian forbearance and patience, form a secure shield against the reckless and wanton charges of his irritable and violent assailant. If reflections have been cast on the character of Newton by the animadversions of Flamsteed, the conduct of the latter has been exposed to a scrutiny which it may not be able to sustain; and the friends of Newton are reluctantly compelled to collect the opinions which contemporary writers had expressed of Flamsteed, in order to enable the public to form a just estimate of the testimony which he has borne against his fellow-labourer in science.

Those who wish to know more of the differences between Newton and Flamsteed, may consult the volume above mentioned, which is entitled *An Account of the Rev. John Flamsteed, the first Astronomer Royal*, compiled from his own manuscripts, and other authentic documents never before published; to which is added, his *British Catalogue of Stars*, corrected and enlarged, printed by order of the Lords Commissioners of the Admiralty, Lon-

¹ This volume was not published; the whole impression, which was small, being distributed in presents to scientific institutions, public libraries, and individuals interested in the subjects to which it relates.

Newtonian Philosophy || Newton.
 don, 1835. Mr Baily, at his own expense, published, in January 1837, a supplement to this work, which, with his usual liberality, he "distributed amongst those persons and institutions only to whom the original work was presented." (N. N. N.)

NEWTONIAN Philosophy, the doctrine of the universe, and particularly of the heavenly bodies, their laws, affections, &c. as delivered by Sir Isaac Newton.

The term *Newtonian philosophy* is applied very differently. Some authors under this denomination include all the corpuscular philosophy, considered as it now stands corrected and reformed by the discoveries and improvements made in several parts of it by Sir Isaac Newton. In this sense it is that 'sGravesande calls his elements of physics *Introductio ad Philosophiam Newtonianam*; and in this sense the Newtonian is the same with the new philosophy, standing contradistinguished from the Cartesian, the Peripatetic, and the ancient corpuscular system. By Newtonian philosophy others mean the method or order which Sir Isaac Newton observes in philosophizing, viz. the reasoning and drawing of conclusions directly from phenomena, exclusive of all previous hypotheses; the beginning from simple principles, deducing the first powers and laws of nature from a few select phenomena, and then applying those laws, &c. to account for other things. And in this sense the Newtonian philosophy is the same with the *experimental* or *inductive philosophy*, and stands opposed to the ancient corpuscular system. By this philosophy some understand that particular kind in which physical bodies are considered mathematically, and where geometry and mechanics are applied to the solution of the appearances of nature. In this sense the Newtonian is the same with the *mechanical* and *mathematical philosophy*. Others, again, by Newtonian philosophy, understand that part of physical knowledge which Sir Isaac Newton has handled, improved, and demonstrated, in his *Principia*. Lastly, by it is meant the new principles which Sir Isaac Newton has brought into philosophy, the new system founded thereon, and the new solutions of phenomena thence deduced, or that which characterizes and distinguishes his philosophy from all others; and this is the sense in which it ought to be used.

As to the history of this philosophy, we have nothing to add to what has been stated in the preceding and in other articles. It was first made public in the year 1687, by the author, then a fellow of Trinity College, Cambridge; and in the years 1713 and 1726 republished with considerable improvements. See the articles ASTRONOMY, ATTRACTION, DYNAMICS, MECHANICS; Professor Playfair's Dissertation (part ii. sect. ii. p. 535); and Sir John Leslie's Dissertation (sect. vii. p. 655).

NEWTON, Thomas, lord bishop of Bristol, and dean of St Paul's, London, was born on the 1st of January 1704. His father, John Newton, was a considerable brandy and cider merchant, who having, by his industry and integrity, acquired what he thought a competent fortune, left off trade several years before he died. Young Newton received the first part of his education in the free school of Lichfield, which, the bishop observes with some kind of exultation, had at all times sent forth several persons of note or eminence, from Bishop Smalldridge and Mr Wollaston, to Dr Johnson and Mr Garrick. From Lichfield he was, in 1717, removed to Westminster School, and placed under the care of Dr Freind and Dr Nicoll. During the time he remained at Westminster, there were, he observes, more young men who afterwards made a distinguished figure in the world, than perhaps at any other period, either before or since. He particularly mentions Murray, afterwards Earl of Mansfield, with whom he lived upon terms of the greatest friendship to the close of his life. Having passed six years at Westminster School, he went to Cam-

bridge, and entered at Trinity College, where he constantly resided eight months at least in every year, till he took his degrees in arts. Being chosen fellow of his college, he went afterwards to settle in London. As it had been his inclination from childhood, and as he was likewise designed for holy orders, he had sufficient time to prepare himself, and composed some sermons, that he might have a stock in hand when he entered on the ministry. His title for clerical orders was his fellowship; and he was ordained deacon in December 1729, and priest in the February following, by Bishop Gibson. Upon his first setting out in this office, he was curate at St George's, Hanover Square, and continued for several years assistant preacher to Dr Trebeck. His first preferment was that of reader and afternoon preacher at Grosvenor Chapel, in South Audley Street; an appointment which introduced him to the family of Lord Tyrconnel, to whose son he became tutor. He continued in this situation for many years, living much at his ease, and on terms of great intimacy and friendship with Lord and Lady Tyrconnel, "without so much," he tells us, "as an unkind word or a cool look intervening." In the spring of 1744, he was, through the interest of the Earl of Bath, his great friend and patron, presented to the rectory of St Mary le Bow; so that he was forty years of age before he obtained any living. At the commencement of the year 1745 he took his doctor's degree. In the spring of 1747 he was chosen lecturer of St George's, Hanover Square, by a most respectable vestry of noblemen and gentlemen of high distinction. In August following he married his first wife, the eldest daughter of Dr Trebeck, an unaffected, modest, decent young woman, with whom he lived happily for nearly seven years. In 1749 he published his edition of Milton's *Paradise Lost*, which was well received by the public, and by 1775 had gone through eight editions. After the *Paradise Lost*, it was judged proper that Dr Newton should likewise publish the *Paradise Regained*, and other poems of Milton; but these things he thought detained him from other more material studies, though he had the good fortune to gain more by them than Milton did by all his works put together. But his greatest gain consisted in their first introducing him to the friendship and intimacy of two such men as Bishop Warburton and Dr Jortin. In 1754 he lost his father, at the age of eighty-three; and within a few days his wife, at the age of thirty-eight. This was the most severe trial he ever experienced, and it almost overwhelmed him. At that time he was engaged in writing his *Dissertations on the Prophecies*; and in his affliction he found no better nor more effectual remedy than plunging deeply into study, and fixing his thoughts as intensely as he possibly could upon other subjects. The first volume was published the following winter, but the other did not appear till three years afterwards; and as a reward for his past and an incitement to future labours, he was in the mean time appointed to preach Boyle's lecture. The bishop himself informs us, that twelve hundred and fifty copies of the *Dissertations* were taken off at the first impression, and a thousand at every other edition; and "though," he adds, "some things have been since published upon the same subjects, yet they still hold up their head above water, and having gone through five editions, are again prepared for another. Abroad, too, their reception has not been unfavourable, if accounts from thence may be depended upon." They were translated into the German and Danish languages, and received the warmest encomiums from persons of learning and rank. In the spring of 1757, he was made prebendary of Westminster, in the room of Dr Green, and promoted to the deanery of Salisbury. In October following, he was made sub-almoner to his majesty, an appointment which he owed to Bishop Gilbert. In September 1761, he married a second wife, the

Newton.

Newton-Stewart.

widow of the Rev. Mr Hand, and daughter of Viscount Lisburn; and in the same month he kissed his majesty's hand for his bishopric. On the death of Dr Stone, the primate of Ireland, in the winter of 1764, Mr Grenville sent for Bishop Newton, and in the most obliging manner desired his acceptance of the primacy; but having maturely weighed the matter in his own mind, he declined the offer. In 1768 he was made dean of St Paul's. His ambition was now fully satisfied, and he firmly resolved never to ask for any thing more. From this time till his death his health was almost constantly infirm; indeed it is wonderful that such a poor, weak, and slender thread as the bishop's life, should have been spun out to such an amazing length as it really was. In the autumn of 1781, he laboured under repeated illnesses; and on Saturday the 9th of February 1782, his breathing began to be much affected by the frost. His complaints grew worse till the following Thursday, when he got up at five o'clock, and was placed in a chair by the fire, having suffered much in bed. About six o'clock he was left by his apothecary in a quiet sleep; between seven and eight he awoke, and appeared rather more easy, and took a little refreshment. He continued dozing till near nine, when he ordered his servant to come and dress him, and help him down stairs. As soon as he was dressed, he inquired the hour, and bade his servant open the shutter and look at the dial of St Paul's. The servant answered that the clock was about to strike nine. The bishop made an effort to take out his watch with an intent to set it, but sunk down in his chair, and expired without a sigh or the least visible emotion, his countenance still retaining the same placid appearance which was so peculiar to him when in life.

NEWTON-STEWART, a small town in the county of Wigton, and parish of Penninghame, Scotland. It extends about a mile on the right bank of the river Cree, and consists of one long street, in which is the tolbooth, and a very short one along the old road to Glenluce. It is connected with Creebridge, a village of about 220 inhabitants, in the stewartry of Kirkcudbright, by an elegant bridge of granite over the river Cree. The post-road from London to Portpatrick passes through the town. The first houses were built in 1701, and for many years the number seems to have been small. It was erected into a burgh of barony about the year 1780, by the then proprietor, under the name of Newton-Douglas; but the original name has been again assumed. About the year 1793, a cotton manufactory was established on the banks of the Cree, at an expense of L.20,000; but the speculation did not succeed, and it was eventually given up. The whole property belonging to the company was purchased in 1830 by the Earl of Galloway, who is superior of the town. Cotton weaving forms a considerable part of the trade of the place; but it has diminished much of late years. The curing of bacon has been carried on for several years back, and the amount brought by the curers has yielded from L.5000 to L.7000 annually to the inhabitants of the surrounding district. There are several tan-works, and an extensive brewery, in full operation. Vessels of from thirty-five to seventy and eighty tons registered burden, and even some of a larger size, sail up the Cree to within a mile of Newton-Stewart. Their cargoes generally consist of coals, lime, and merchants' goods. Besides the parish school, there is an endowment, called the Douglas School, for the education of the children belonging to the place. Arrangements are at present (1837) in a state of forwardness to erect a new parish church, instead of the old church, built in 1777. There are other three places of worship in the town, one belonging to the Relief body, one to the Reformed or Cameronian presbytery, and a Roman Catholic chapel. There is a weekly market held on Friday, and various cattle markets throughout the year. The

population amounted in 1821 to 1774, and in 1831 to 2260.

NEWTY FORT, a small fortress of Hindustan, on the western coast of the province of Concan, situated on the southern bank of a small river. Long. 73.40. E. Lat. 15.56. N. Newty Fort
||
New York.

NEW YEAR'S GIFTS, presents made on the first day of the new year. Nonius Marcellus refers the origin of this custom amongst the Romans to Tatius king of the Sabines, who reigned at Rome conjointly with Romulus, and who having considered as a good omen a present of some branches that had been cut in a wood consecrated to Strenia, the goddess of strength, which he received on the first day of the new year, authorized this custom afterwards, and gave to these presents the name of *strenæ*. However this may be, the Romans on that day celebrated a festival in honour of Janus, and at the same time paid their respects to Juno; but they did not pass it in idleness, lest they should become indolent during the rest of the year. They sent presents to one another, of figs, dates, honey, and other things, to show their friends that they wished them a happy and agreeable life. Clients, that is to say, those who were under the protection of the great, carried presents of this kind to their patrons, adding to them a small piece of silver. Under Augustus, the senate, the knights, and the people presented such gifts to the emperor, and in his absence deposited them in the Capitol. Of the succeeding princes, some adopted this custom and others abolished it; but it always continued amongst the people. The early Christians condemned it, because it appeared to be a relic of paganism and a species of superstition; but when it began to have no other object than that of serving as a mark of benevolence and esteem, the church ceased to disapprove of it.

NEW YORK, one of the thirteen original states of the North American confederacy, and the most populous and important in the Union. It is bounded on the north by Upper and Lower Canada; on the east by the states of Vermont, Massachusetts, and Connecticut; on the south-east by the Atlantic Ocean; on the south by New Jersey and Pennsylvania; on the west by Pennsylvania, Lake Erie, and the Niagara River; and on the north-west by Lake Ontario and the river St Lawrence. The territory of New York is situated between latitude 40. 30. and 45. north, and between longitude 5. 5. east, and 2. 55. west from the city of Washington. Its extreme length from east to west is about 340 miles, and, including Long Island, 408 miles; and its greatest breadth from north to south is 310 miles, its area being about 46,000 square miles. This estimate includes the whole surface, except the waters of the great lakes.

New York is an epitome of all configurations of surface, Physical and every variety of lake, mountain, and river scenery. Physical aspect. It may be described, generally, as an elevated tract, with indentations in various parts below its usual level. The most striking depressions are the great basins in which are situated Lakes Erie and Ontario, and the long narrow valley which contains the Hudson River and Lake Champlain. The two latter are united by a valley occupied by the Mohawk River and Lake Oneida. The south-eastern angle of the state, about forty miles above the city of New York, is mountainous, being traversed by several ridges from New Jersey, one of which crosses the Hudson in the vicinity of West Point, and forms the high lands of that river. It also constitutes the dividing ridge between the Hudson and the Connecticut, and lies partly in the state of Connecticut. The space south of the Mohawk River and the Ontario Valley, and between the River Hudson and Lake Erie, is occupied by another mountainous district, the western part of which forms a table-land having 2000 feet of mean elevation, and is the source of several large rivers,

New York. particularly the Alleghany, the Susquehannah, and the Genesee. The eastern part, lying between Lake Seneca and the Hudson, is occupied by several parallel mountain ridges, which may be considered as continuations of the Alleghany ridge passing out from Pennsylvania. These ridges run in a north and south direction, and their indentations give rise to several fertile valleys. The highest are the Catskill Mountains, which bound the valley of the Hudson on the west. Round Top, the most elevated summit, is 3804 feet above the level of the tide-water of the Hudson. There is also a narrow table-land in this subdivision, situated a little south of the line of the Erie Canal, and continuing almost uninterruptedly from the Catskill Mountains to the head of Seneca Lake. On this elevation are situated a number of lakes, the height of which above tide-water varies from 380 to 1200 feet. A third mountain district is situated to the north of the Mohawk, between Lake Champlain and the east end of Lake Ontario. This division is traversed by at least five or six parallel ridges, passing in a north-eastern direction, and which are considered as continuations of the Appalachian chain. The highest elevation that has been ascertained with accuracy is a peak belonging to the ridge that passes through Herkimer and Hamilton counties, and the northern part of Essex, near the sources of the Hudson. It is 2686 feet above the level of the sea.

Basins,
lakes, and
rivers.

We have already mentioned the basins in which are situated Lakes Erie and Ontario, and the valley which contains the Hudson River and Lake Champlain. The two former depressions are portions of the vast St Lawrence basin, which embraces the whole of the five great western lakes. Proceeding along the basin of the Ontario, we pass through a series of fertile counties, constituting the slope, watered by numerous rivers, which all finally terminate in the lake. The Genesee, Oswego, and Black are important streams, which rise in the interior of the state. The first-named river is the outlet of the Canesus, Hemlock, and Honeyoe Lakes. The Oswego, and its tributaries the Clyde and Seneca, convey the waters of Canandaigua, Crooked, Seneca, Cayuga, Owasco, Skaneateles, Onondaga, and Oneida Lakes into Lake Ontario. The Mohawk River occupies the eastern termination of this basin; whilst towards the north-east the slope towards the St Lawrence, indicated by the course of the Grass, Racket, Oswegatchie, and St Régis Rivers, shows it to be a continuation of that towards the lakes. The Hudson and Champlain Valley stretches nearly north and south, and is remarkable for its depth below the general surface of the level of the adjoining country. In the northern part are situated Lakes George and Champlain, which are connected with each other. The southern portion communicates with the valley of the Mohawk, which enters it in a south-easterly direction. The Hudson rises in the northern part of New York, between Lake Champlain and the St Lawrence, and has its whole course in the state. An American writer on geography thus describes this river:—"No fact in the topography of the state of New York is more remarkable than the peculiar position of the Hudson and its branches. If we trace the course of any Atlantic river south of it, we shall find the navigation closed by the mountain chain on the west. Not so with the Hudson. It penetrates the high lands, and after passing up some hundred and sixty miles, it is met by a tributary, the sources of which reach nearly to the lakes. Here the happy conformity of the country is such as to permit the establishment of an artificial navigation." After a course of between three and four hundred miles, the Hudson falls into the Bay of New York, above which it is navigable for ships about one hundred and thirty miles. The Susquehannah rises in this state, and passes into Pennsylvania, as does also the Delaware. The Alleghany of the Ohio collects its head waters in the south-west

angle of this state, and passes through its noble pine-forests into Pennsylvania. Here are a vast number of lakes and streams besides those named, which would be conspicuous in a state of smaller dimensions, and where the configuration is on a less gigantic scale. But we have preferred presenting general views of the conformation of the face of the country to a dry catalogue of lakes and rivers and mountains, with their courses and terminations. Those which are remarkable for their size or peculiarities will be found more particularly described under their respective designations. Some celebrated mineral springs exist in this state. Those of Saratoga and Ballston are more resorted to than any others in the United States. The Ballston springs are situated in a valley formed by a small creek. There are a great number of them, the strongest and most sparkling waters being those obtained in 1827, by boring 227 feet down. The principal efficacy of the water arises from a chemical union of chalybeate and saline ingredients held in solution, and the presence of uncommon quantities of carbonic acid gas. Saratoga springs are several miles distant from those of Ballston, and belong to the same class of mineral waters. A large and compact village has sprung up at this place, in consequence of the immense resort to it from all parts of the United States, Canada, and even the West Indies. Saratoga springs are thirty-two miles north of Albany. To these may be added the tepid springs of New Lebanon, twenty-nine miles east of Albany, which are frequented for bathing, and on account of their cool and elevated position; and the sulphur springs of Avon; to all which places crowds of fashionable people and invalids resort during the summer months.

Most of the formations discriminated in works of geology exist in this state, and some of them are of a very interesting character, particularly the earth and gypsum found in the western part of the state. Granite, slate, and limestone hills occur; and one species of impure limestone, found in the western and northern parts of New York, has been used with great success in the construction of canals. Marble has been obtained in large quantities, for architectural purposes, from the quarries of Sing Sing. Its purity is said to increase with the depth of the excavations, and several large and beautiful public edifices have been constructed of it. At the head of Lake Onondaga are situated salt springs of the same name, surrounded by the waters of the lake, which still, however, continue perfectly fresh. Plants peculiar to the sea-coast are found here, in particular the *salicornia* and *salsola*. Underneath the mud or decayed vegetable matter which constitutes the valley of these springs, a stratum of earthy marl is found, containing numerous fossil univalves; and this again appears to be succeeded by a conglomerate. The peculiar nature of the underlying rock, or rather its position, does not seem to be determined. Great quantities of salt are manufactured here by the various processes of boiling and solar evaporation. Gypsum, in its various forms of earthy gypsum, selenite, and even alabaster, is found, particularly in the counties of Onondaga and Cayuga, and is extensively used for agricultural purposes. Another prominent article of mineral wealth is iron ore, immense beds of which are found in the counties west of Lake Champlain. The iron ore of Columbia county is likewise highly valued and extensively manufactured. Lead, silver, zinc, titanium, and other metals, have been detected in various parts of the state; and anthracite or bituminous coal is found, but it is questionable whether in sufficient quantities to afford remuneration for the expenses of mining. Petroleum, porcelain clay, and most of the fossils, are found in different places, and some of the organic remains discovered belong to the higher animals. Transition and secondary rocks compose the body of the state; and in the granitic dis-

New York. tracts, near New York, and on the borders of Lake Champlain, picturesque and remarkable projections of rock, caverns, and the like, frequently occur. The cataracts and smaller falls of water are numerous in this state; and those of Niagara are the most magnificent in the world. Cohoes is a fine fall on the Mohawk River, having seventy feet of perpendicular descent. The Little Falls on the same river present most beautiful scenery; and amongst the remarkable objects connected with the artificial navigation of New York, may be mentioned the aqueduct at Little Falls, that over the Genesee at Rochester, and the locks at Lockport, at Little Falls, and at the junction of the northern and western canals. Glen's Falls on the Hudson, and those on the Genesee in the village of Rochester, and at Ithaca, also deserve mention as very striking cascades, but only too near Niagara to be famous. A limestone cavern of vast dimensions, with its falls, columns, and stalactites, exists on the banks of Black River, opposite Waterton. The ridge road, extending from Rochester to Lewiston, is a most remarkable geological formation. As its name implies, it is a natural road of sufficient width for the purposes of travelling, and generally is extremely level. It runs nearly parallel with the shores of Lake Ontario, from which it is distant sometimes several miles. There is a remarkable natural production of carburetted hydrogen in the towns of Fredonia and Portland, Chautauque county. This gas is obtained in such immense quantities that it has been conducted into these villages, and used as a natural gas-light. In the western part of this state are situated the hunting grounds and residences of the famous six Indian nations, who have now submitted to the restraints of civilization; and these are adorned by the productions of industry and refinement, yet still show traces of their former existence in the mounds and other antiquities occasionally observed.

Islands.

There are several islands belonging to the state of New York. Long Island, as its name imports, is a long but narrow strip of insular land, extending east from the city of New York one hundred and fifty miles, forming a curve parallel to the mainland shore, and leaving a broad and beautiful sheet of water not unlike a wide river between, called Long Island Sound. It contains three counties, the chief towns being Brooklyn, Jamaica, Sag Harbour, and Flatbush. The south border is a long belt of sand, somewhat barren; but the northern has a fertile soil, and is in a high state of cultivation, producing large quantities of grain, fruits, and hay. Like other insular positions, it has a climate more mild than that of the adjacent continent. Sag Harbour is the principal port. New York is in a great measure supplied with wood from this island, the eastern part of it being remarkably well adapted to its growth. On the west, Long Island is divided from Staten Island by the narrows, and from Manhattan Island by East River. On the latter island is situated the city of New York, which will be afterwards described. Staten Island is above fourteen miles in length by from five to eight in breadth, and is the most southern land belonging to New York.

Soil, climate, and productions.

In the maritime belt of the state the soil is sandy; in the middle it is a finely undulating and productive country; and in the western and southern divisions it is remarkably level, rich, and inclining to alluvial formation. The state has a great proportion of first-rate land. The country on the Hudson, below the mouth of the Mohawk, has a good medium soil. The counties of Westchester and Dutchess are under very good cultivation. The alluvial flats of Columbia and Rensselaer are very extensive and rich. A considerable district west of Albany consists of sandy plains interspersed with marshes. The alluvial flats upon the Mohawk are large and extremely fertile. The soil of the elevated plain of the western region, being occupied by the small lakes, is a rich mould equally well adapted to

grain and grass. The alluvial flats are here extensive; those on the Mohawk comprise about 60,000 acres. With regard to climate, a general view can scarcely be given of a country which stretches over four degrees and a half of latitude. In the northern division, which abuts upon Canada, the climate, as might be expected, is somewhat severe, partaking of the nature of these northern regions. In the south-east, towards the sea, it is temperate, but subject to sudden and great changes. As the eastern boundary of New York passes along the borders of the states of Connecticut, Massachusetts, and Vermont, the climate of these parts resembles that of the states to which they are contiguous. After passing the high lands, and entering into the eastern country beyond Utica, the climate becomes milder than it is to the eastward. In the western parts, contiguous to Lakes Ontario and Erie, the temperature is moderated by these waters, and does not reach the same extremes as in the south-east. The climate of the whole state is in general healthy, and favourable to cultivation. A mass of interesting facts regarding temperature has been obtained, in consequence of the regents requiring annual meteorological reports from the academies under their care. These academies are scattered over every part of the state, and the mean temperature of the whole thus furnishes an approximation towards that of the state generally.

In 1826, the mean temperature of ten places reporting complete annual tables was.....	49.38
In 1827, the mean temperature of 18 places was.....	46.48
In 1828, the mean temperature of 24 places was.....	49.50
In 1829, the mean temperature of 28 places was.....	46.45
In 1830, the mean temperature of 34 places was.....	48.15

Mean of the five years.....48.00

The quantity of rain and snow has also been ascertained in a similar manner. Thus:

In 1826, the mean rain and snow of nine places was...	36.34
In 1827, the mean rain and snow of 17 places was...	44.29
In 1828, the mean rain and snow of 25 places was...	36.74
In 1829, the mean rain and snow of 25 places was...	34.88
In 1830, the mean rain and snow of 32 places was...	38.86

Mean of the five years.....38.22

The highest degree of temperature noticed in these tables is 104°, at which the thermometer stood in an academy in the county of Orange, on the 20th of July 1830. It is situated in lat. 41. 32. north, and long. 74. 10. west. The lowest degree noticed is — 33, at which the thermometer stood in an academy in the county of Lewis, on the 31st of January 1830. It is situated in lat. 43. 47. north, and long. 75. 33. west. The range of the thermometer in New York state is therefore 137 degrees of Fahrenheit. It is rarely lower than — 33; but on the 4th of January 1835, it fell forty degrees below zero at New Lebanon. This, however, is an extreme case. The scale of variation in summer may be given at from 35° to 60°, in autumn at from 60° to 73°, in winter at from 70° above to 26° below zero, and in spring at from 3° to 75°. The variation is greatest upon the Atlantic coast, along the St Lawrence, and around Lakes Ontario and Erie; the north-east, east, south-east, and south-west winds being more prevalent upon the coast, and the north-east and south-west upon these lakes and along the St Lawrence. The variations of the weather at all seasons are great and sudden, changing the temperature in a few hours 40° or 50°, rising with the southerly, and diminishing with the northerly winds.

The staple productions of New York consist principally of wheat and other grain, flour, flax, hemp, provisions, salt, pot and pearl ashes, and lumber. The forest trees, which thrive to the greatest advantage in an alluvial soil, are common in the western divisions of this state, and at

New York. tain a large size. Wheat, however, is considered as the grand staple of New York.

The great wheat district of the state commences in the valley of the Mohawk, above the primitive spur at Little Falls, in a fertile soil of calcareous alluvion, which over-spreads the valley at German Flats. This district, comprehending the central portions of Oneida county, extends westward to the lakes, and is bounded northwards by the north ridge of the valley, by Lake Ontario, and southwards by a line running south-west from Utica to the mouth of Cattaraugus Creek at Lake Erie. This is the garden of the state, including the rich Seneca vale, and the far-famed Genesee county. Some portions of this district are sandy, and in others the rock rises too near the surface, whilst others are not sufficiently watered; but taken as a whole, it is not surpassed by any district of equal extent in the United States. Here artificial manures are rarely used, and indeed rarely needed. In the newly-cleared lands, the richness of the mould and of the sub-soil is all that the farmer requires, being content if, by clearing away the forest, he can only bring it forth. Amongst the obstructions which the stumps of the trees offer, he is compelled to plough as he can, not as his judgment might dictate. In tracts long cleared, deep ploughing, blending the mould and the soil, preserves the former, and turns up the latter to disintegrate, and thus to yield its calcareous matter. Upon such farms some attention is given to rotation in crops, with a view to the preservation of fertility; but it is not uncommon to find the same field sown in wheat for a series of years, without the intervention of other crops. Taking the whole district together, the average product of wheat may be from twenty-five to thirty bushels the acre; but from forty to fifty are frequently obtained. Instances have been known of more than eighty bushels to the acre, and of Indian corn one hundred and twenty-five. The apple, pear, cherry, and quince, all thrive admirably; and the peach in size and flavour is scarcely inferior to that of the Atlantic coast. Grapes also, both foreign and indigenous, richly repay careful cultivation.

The region south of the line above drawn, and north of the southern boundary of the state, and between Lake Erie and that portion of the Kaatsbergs which runs parallel with the Hudson, may be characterized as a grazing country. Upon its northern border, the limestone, being more abundant than in other parts, renders the soil more or less productive in wheat; and this section, producing grain and grass abundantly, is by many preferred to that which is most fertile in wheat. By far the larger portion of this south-western district is yet covered with forests, and in most places upon its southern borders, the chief business of its inhabitants consists in the cutting and vending of lumber, consequently its agricultural products are inconsiderable compared with its population. There are, however, some well cultivated tracts in all the border counties, and in Chautauque, upon the shores of Lake Erie. One of the most useful improvements introduced into agriculture, and the result partly of experience, partly of the necessity imposed by the opening of the eastern markets to the western region, is the appropriation of soils exclusively to the productions for which they are by nature adapted, and the consequent abandonment of the practice of endeavouring to compel every species to yield crops to which it is not congenial. Under this wise system much of the country upon the North River has ceased to be a grain district. Large portions of it are devoted to horticulture, for supplying culinary vegetables to the greatly increasing population of the cities and numerous villages; and those portions of the district most remote from markets are being rapidly converted into pasturage. Thus the comparatively sterile soil of Long Island and Westchester is profitably devoted to the production of garden

and field esculents, fruit, hay, oats, and small meats, for New York. the great market of the city, in the proximity of which the cultivator finds ample compensation for the inferiority of soil, and the consequent greater cost of production, his lands being by this circumstance, and the facility of obtaining manures, rendered more valuable than the naturally rich fields of the west. Thus, too, the high and hilly grounds of Putnam county have, by the free use of gypsum, been made very productive pastures, in which the plough is comparatively little used, and which maintain large droves of cattle and sheep, but chiefly of the former. The counties of Dutchess, Columbia, and Washington, especially the two first, comprising considerable portions of limestone soil, alternating with slate, produce profitable crops of wheat. But the eastern and northern portions of Dutchess, and the hilly sections of Columbia, are chiefly laid out in sheep farms, and in Washington the raising of sheep is rapidly becoming the staple business. In Orange county the chief products are those of the dairy, and the butter of this county has long been held in the highest estimation. The raising of sheep also extends rapidly here. Ulster and Greene counties likewise produce large quantities of cattle and sheep, and, of late years, of butter and hay for export. The portions of Albany and Saratoga counties which are not covered with sand, and the portion of the latter not included in the primitive mountains, are under good cultivation. Wheat is not unprofitable, and Albany exports large quantities. Still the best returns are obtained from cattle and sheep. The northern counties of Warren, Essex, and Clinton, can boast but little of their agriculture; yet the primitive virgin mould is scarcely anywhere exhausted, and the forest trees grow thickly and to a large size. The abundance of timber, and the facility of getting it to market, together with the rich mineral deposits, have hitherto chiefly occupied the attention of the inhabitants. The northern portions of Franklin and St Lawrence counties, very partially cleared, and level or gently undulating, are well adapted for cultivation. No parts of the state yield better grass, and the raising of cattle and sheep is found to be the most profitable employment of the soil, although it is well adapted to wheat, Indian corn, and other grains. Jefferson county is very productive of wheat, as are other parts of New York, which, however, do not require to be specially mentioned. Societies have been formed in various parts of the state for the promotion of agriculture and horticulture, and they have already been productive of much good.

The line of extraordinary works, supposed to have been Antiquities of a military character, which may be traced from the shores of Lake Ontario as far as the valley of the Mississippi, and thence southward to an indefinite extent, must not be overlooked in our survey of the surface of this state. These works consist of earthen parapets, the sites of which, with a view to defence, appear to have been selected with much judgment, and upon the construction of these greater skill has been exercised than any displayed by the Indian races known to us. The erection of these fortifications has been ascribed to the European nations, French and Spanish, who, at periods immediately subsequent to the discovery of America, visited its shores, and also to a race of inhabitants supposed to have preceded that found there by the Europeans. The works themselves afford no means of tracing their origin, but they display indubitable marks of high antiquity, so that the opinion of their having been constructed by the French or the Spaniards is at once exploded. The forms of these remains are various, being circular, elliptical, triangular, and square; and they are generally placed in situations which command the adjacent country. Near many of the forts are mounds of earth raised for cemeteries, in which human bones in various stages of decay have been discovered. The number of forts and mounds situated in

New York. the western parts of this state much exceeds an hundred. The enclosed areas of the fortifications vary from six acres to one hundred feet in diameter; and the earthen walls which enclose them, in their present abraded condition, are from ten to twelve feet in height, and from six to eight feet in breadth. Some of these breast-works bear or have borne trees, whose age has been estimated at more than two hundred and seventy-five years, and which may have been preceded by others. One fact seems to indicate that the architects were not greatly advanced in civilization. In the remnants of manufactured articles found, there is an absence of any finished works of art in wood or metals, and the fragments of pottery are rude and of a primitive form. They are therefore in all likelihood not the production of the Toltecs or the Aztecs who found their way to Mexico over the northern parts of the continent, but must be attributed to the Alligewi or some other Indian tribe.

About twenty-five years ago, this state commenced a New York. system of internal improvement, which has been prosecuted on an extensive scale, and with great success. The Canals. enterprise of this nature which was first undertaken is the Erie Canal, one of the greatest and most important works of the kind in the world. It was begun on the 4th of July 1817, and was completed in 1825. The principal canals in New York, with the exception of the Hudson and Delaware Canal, have been constructed by the state, and are now its property. But the railroads have been mostly undertaken by incorporated companies. The railroad first undertaken in the state was the Mohawk and Hudson Railroad, which was begun in 1830, and finished in 1833. Since that time several railroads have been completed, more are in progress, and a still greater number are projected. For details as to the extent of inland navigation in the state of New York, see the article NAVIGATION, INLAND.

The following table shows the number of railroads which have been completed.

Names.	From	To	Completed.	Length in Miles.
Buffalo and Black Rock.....	Buffalo.....	Black Rock.....	1835	3
Ithaca and Oswego.....	Ithaca.....	Oswego.....	1834	29
Mohawk and Hudson.....	Albany.....	Schenectady.....	1832	16
Rensselaer and Saratoga.....	Troy.....	Ballston Spa.....	1835	24½
Rochester.....	Rochester.....	Carthage.....	1833	3
Saratoga and Schenectady.....	Saratoga Springs.....	Schenectady.....	1832	22
Utica and Schenectady.....	Utica.....	Schenectady.....	1836	77
Total.....				174½

The railroads which have been commenced are the following :

Names.	From	To	Length in Miles.
Auburn and Syracuse.....	Auburn.....	Syracuse.....	26
Buffalo and Niagara.....	Buffalo.....	Niagara Falls.....	21
Catskill and Canajoharie.....	Catskill.....	Canajoharie.....	68
Haerlem.....	Prince St. N. Y.....	Haerlem.....	7
Hudson and Berkshire.....	Hudson.....	Massachusetts line.....	30
Lockport and Niagara.....	Lockport.....	Niagara Falls.....	24
Long Island.....	Brooklyn.....	Greenport.....	98
New York and Erie.....	New York city.....	Lake Erie.....	505
Saratoga and Washington.....	Saratoga Springs.....	Whitehall.....	41
Tonawanta.....	Rochester.....	Attica.....	45
Total.....			865

The New York and Erie Railroad, one of the greatest works of the kind that has ever been projected, extending from the city of New York, through the southern counties of the state, to Portland and Dunkirk on Lake Erie, was commenced in November 1835. The total expense of this vast undertaking is estimated at 2,717,518 dollars. Up to the end of 1834 there had been forty other railroad companies incorporated, having a capital of thirty-five mil-

lions of dollars; and in the session of 1836 there were no less than forty-two incorporated. One of these, the Utica and Syracuse Railroad, above fifty miles in length, and several others, have either commenced very lately, or are now (1837) about to commence.

The following tables present so complete a view of the actual state of New York as to render any detailed description unnecessary.

Census of the Population of the State in 1830 and 1835.¹

Counties.	Towns.	Population in 1830.	Population in 1835.	Male Aliens.	Paupers.	Coloured not Taxed.
Albany.....	10	53,520	59,762	3,381	339	1,187
Alleghany.....	28	26,276	35,214	143	38	118
Broome.....	11	17,579	20,190	426	38	128
Cattaraugus.....	23	16,724	24,986	141	35	32
Cayuga.....	22	47,948	49,202	548	85	298
Chautauque.....	24	34,671	44,869	400	15	109
Chenango.....	19	37,238	40,762	1,170	12	244
Clinton.....	8	19,344	20,742	1,996	72	65
Columbia.....	18	39,907	40,746	553	166	1,469
Cortland.....	11	23,791	24,168	85	50	61
Delaware.....	18	33,024	34,192	475	69	135
Dutchess.....	18	50,926	50,704	960	189	2,071
Erie.....	17	35,719	57,594	5,172	63	452
Essex.....	15	19,287	20,699	625	60	26
Franklin.....	12	11,312	12,501	1,009	43	11
Genesee.....	24	52,147	58,588	978	83	59
Greene.....	11	29,525	30,173	633	154	971
Hamilton.....	4	1,324	1,654	...	...	...
Herkimer.....	18	35,869	36,201	1,024	62	228
Jefferson.....	19	48,515	53,080	1,712	89	125
King's.....	6	20,535	32,057	3,414	238	1,897
Lewis.....	11	14,958	16,093	604	27	61
Livingston.....	12	27,719	31,092	554	42	133
Madison.....	13	39,037	41,741	1,653	2	245
Monroe.....	17	49,862	58,085	2,484	88	505
Montgomery.....	16	43,595	46,705	1,285	126	549
New York.....	1	202,589	270,089	27,669	1,799	14,977
Niagara.....	11	18,485	26,490	973	38	141
Oneida.....	26	71,326	77,518	4,196	179	458
Onondaga.....	18	58,974	60,908	1,323	127	385
Ontario.....	14	40,167	40,870	697	71	526
Orange.....	14	45,366	45,096	1,265	209	2,098
Orleans.....	8	18,773	22,893	333	20	52
Oswego.....	20	27,104	38,245	1,381	34	160
Otsego.....	22	51,372	50,428	534	94	218
Putnam.....	5	12,628	11,551	67	68	124
Queen's.....	6	22,460	25,130	636	571	2,727
Rensselaer.....	14	49,424	55,515	2,081	182	977
Richmond.....	4	7,082	7,691	294	16	407
Rockland.....	4	9,388	9,696	280	51	415
Saratoga.....	20	38,679	38,012	2,459	53	56
Schenectady.....	6	12,347	16,230	861	160	488
Schoharie.....	10	27,902	28,508	728	60	410
Seneca.....	10	21,041	22,627	101	97	474
St Lawrence.....	24	36,354	42,047	323	47	154
Steuben.....	24	33,851	41,435	267	62	278
Suffolk.....	9	26,780	28,274	225	101	2,068
Sullivan.....	9	12,364	13,755	219	21	112
Tioga.....	19	27,690	33,999	143	38	189
Tompkins.....	10	36,545	38,008	256	6	246
Ulster.....	14	36,550	39,960	659	137	1,384
Warren.....	9	11,796	12,034	104	36	34
Washington.....	17	42,635	39,326	924	94	324
Wayne.....	15	33,643	37,788	684	6	154
Westchester.....	21	36,456	38,790	1,047	216	1,513
Yates.....	8	19,009	19,796	165	43	118
Total.....	797	1,919,132	2,174,517	82,319	6,821	42,836

¹ From Williams's New York State Register. In 1820 there were ten thousand slaves in New York, but slavery is now abolished in the state. New York has thus set an example which might be creditably followed by the other slave-holding states.

Aggregate Valuations of Real and Personal Estate in the several Counties of this State; also the Number of Acres of Land assessed in each County, the Amount of Town and County Taxes, and the Rate of Taxation on each Dollar of the assessed Valuation, for 1835.

Counties.	Acres of Land.	Value of Real Estate.	Value of Personal Estate.	Amount of County Taxes.	Amount of Town Taxes.	Rate of County and Town Tax upon one Dollar of Valuation.
		Dollars.	Dollars.	Dollars.	Dollars.	Mills. Fr.
Albany.....	297,351	9,050,370	4,440,536	41,000-07	47,398-72	6-100
Alleghany.....	758,380	2,414,359	100,989	12,147-22	12,288-87	...
Broome.....	401,404	1,752,027	268,515	7,146-99	4,035-70	5-640
Cattaraugus.....	788,305	1,439,725	29,968	9,834-22	11,849-73	14-200
Cayuga.....	414,678	3,516,028	927,146	17,706-42	5,980-65	...
Chautauque.....	650,620	2,948,159	208,878	15,086-70	11,659-70	8-000
Chenango.....	514,800	3,299,660	515,392	6,854-73	8,440-18	...
Clinton.....	596,800	1,359,950	68,150	8,060-55	5,525-38	15-000
Columbia.....	399,500	8,469,876	1,806,094	...	...	...
Cortland.....	299,000	2,014,093	298,507	5,451-80	5,203-36	4-800
Delaware.....	847,692	2,858,990	303,387	6,004-03	6,763-75	4-360
Dutchess.....	485,257	13,789,484	4,005,183	28,783-09	10,852-92	2-300
Erie.....	560,566	5,938,400	2,640,187	23,772-57	18,088-28	8-610
Essex.....	744,002	1,383,602	167,986	7,175-43	5,567-86	...
Franklin.....	977,388	862,000	59,709	5,999-96	6,326-30	14-500
Genesee.....	625,280	8,839,263	647,678	20,420-36	13,576-09	...
Greene.....	359,586	2,719,831	607,117	12,626-73	6,504-76	6-360
Herkimer.....	877,000	4,301,801	859,826	12,469-07	...	...
Jefferson.....	720,574	4,279,100	533,964	12,353-22	12,736-35	5-080
King's.....	26,954	28,020,644	3,920,288	28,280-00	39,090-93	1-500
Lewis.....	718,265	1,402,793	188,529	3,293-72	5,902-78	7-917
Livingston.....	316,251	4,865,524	521,915	8,708-55	7,676-47	3-000
Madison.....	377,309	4,392,497	601,745	11,018-69	7,414-83	3-690
Monroe.....	392,982	8,965,694	1,213,630	24,163-10	12,596-88	4-220
Montgomery.....	1,227,712	3,578,807	674,899	19,289-66	13,023-00	...
New York.....	14,000	143,732,425	74,991,278	577,500-00	518,494-00	4-500
Niagara.....	308,662	4,733,924	211,810	10,123-60	6,122-96	4-118
Oneida.....	704,740	9,176,167	1,926,901	22,930-00	15,143-38	4-340
Onondaga.....	455,100	9,427,938	1,162,036	23,094-00	18,609-55	4-012
Ontario.....	395,111	11,386,629	1,784,401	17,850-00	10,035-70	1-810
Orange.....	525,042	8,567,133	1,661,436	20,000-00	11,282-66	3-200
Orleans.....	238,154	4,178,166	259,658	9,283-70	6,534-16	3-900
Oswego.....	580,978	4,308,000	432,020	12,775-25	12,852-68	5-530
Otsego.....	589,302	4,788,285	1,009,714	10,967-11	8,659-62	3-500
Putnam.....	135,352	1,970,901	364,835	3,150-00	1,961-54	2-297
Queen's.....	137,178	6,531,850	2,438,650	5,897-30	6,601-67	1-700
Rensselaer.....	400,106	7,070,537	3,350,957	32,000-00	8,909-39	...
Richmond.....	28,072	800,783	95,917	2,053-00	1,914-03	...
Rockland.....	96,418	1,504,214	354,287	2,840-59	4,6825-3	4-600
Saratoga.....	502,077	5,405,468	970,662	12,800-00	7,814-72	3-750
Schenectady.....	119,494	1,815,623	578,222	8,650-00	5,671-21	5-900
Schoharie.....	353,279	1,990,000	188,344	5,558-08	4,365-61	...
Seneca.....	197,550	3,631,036	732,995	6,531-03	11,249-46	...
St Lawrence.....	1,738,500	2,691,208	233,022	12,092-81	15,274-24	1-171
Steuben.....	897,000	2,839,180	263,019	13,553-97	11,146-03	8-091
Suffolk.....	379,736	4,141,125	927,722	3,379-22	7,890-93	2-000
Sullivan.....	577,000	1,196,136	58,894	4,651-80	4,127-84	7-000
Tioga.....	625,111	2,678,381	454,696	7,410-83	7,256-94	5-200
Tompkins.....	371,400	3,002,450	612,349	7,753-96	2,207-54	2-940
Ulster.....	645,369	4,457,240	611,130	16,100-00	13,119-10	5-630
Warren.....	513,290	889,398	43,452	4,713-83	3,342-49	8-700
Washington.....	486,083	4,974,345	886,981	14,633-38	9,265-94	4-105
Wayne.....	375,576	3,393,465	234,000	8,000-00	7,668-26	...
Westchester.....	280,432	7,768,979	2,324,693	15,026-08	7,967-73	2-200
Yates.....	204,414	2,005,922	284,395	9,500-00	4,000-75	...
Total.....	27,324,232	403,517,585	125,058,794	1,246,314-42	1,032,976-15	5-011

New York. *Comparative View of the Census of the State of New York in 1825 and 1835.*

	1825.	1835.
Whole number of souls.....	1,616,458	2,174,517
Males.....	822,897	1,102,658
Females.....	793,561	1,071,859
Male aliens ¹	...	82,319
Total of aliens.....	40,430	...
Paupers ²	5,610	6,821
Persons of colour not taxed.....	38,770	42,836
Ditto taxed.....	931	934
Ditto qualified to vote.....	298	578
Persons subject to militia duty.....	180,645	201,901
Ditto qualified to vote.....	296,132	422,034
Deaf and dumb persons.....	645	933
Of whom supported by charity...	141	278
Blind persons.....	...	889
Of whom supported by charity...	...	270
Idiots.....	1,421	1,484
Of whom supported by charity...	442	514
Lunatics.....	819	967
Of whom supported by charity...	184	382
Married females under 45 years.....	200,481	283,230
Unmarried ditto between 16 and 45.	135,391	195,499
Ditto ditto under sixteen.....	361,624	456,224
Marriages the year preceding.....	11,553	15,535
Births, male 39,839, female 37,403..	60,383	77,244
Deaths, male 17,486, female 15,280..	22,544	32,726
<i>Agricultural Statistics.</i>		
Acres of improved land.....	7,160,967	9,655,426
Neat cattle.....	1,513,421	1,885,771
Horses.....	349,628	524,895
Sheep.....	3,496,539	4,261,765
Hogs.....	1,467,573	1,554,358

Summary of Manufactures in the State according to the Census of 1835.

	Number.	Value of Raw Materials used and manufactured.	Value of Manufactured Articles.
		Dollars.	Dollars.
Grist mills.....	2051	17,687,009	20,140,435
Saw ditto.....	6948	3,651,153	6,881,055
Oil ditto.....	71	214,813	275,574
Fulling ditto.....	965	1,994,491	2,894,096
Carding machines.....	1061	2,179,414	2,651,638
Cotton factories.....	111	1,630,352	3,030,709
Woollen ditto.....	234	1,450,825	2,433,192
Iron works.....	293	2,366,065	4,349,949
Trip hammers.....	141	168,896	363,581
Distilleries.....	337	2,278,420	3,098,042
Asheries.....	693	434,394	726,418
Glass factories.....	13	163,312	448,559
Rope ditto.....	63	664,394	980,083
Chain cable ditto.....	2	20,871	28,625
Oil cloth ditto.....	24	63,119	95,646
Dyeing and printing do.	15	1,999,000	2,465,600
Clover mills.....	69	95,693	110,025
Paper ditto.....	70	358,857	685,784
Tanneries.....	412	3,563,592	5,598,626
Breweries.....	94	916,252	1,381,446

The manufactures of this state being of great importance, a detailed account of some of them is therefore necessary. Leather is a most important article of manufacture, and it is made cheaper in this state than it can be, of equal quality, in any other part of the world. The increase in the making of sole leather is 500 or 600 per cent. since 1817, and 200 or 300 per cent. since 1827. It is estimated that above one third of the whole sole leather used annually in the United States is made in New York. Above 16,000 individuals are employed and sustained by the cotton factories, which are located as follows, viz. in Oneida county twenty mills; in Rensselaer county fifteen mills; in Dutchess county twelve mills; in Otsego county eleven mills; in Columbia county seven mills; and in Westchester, Washington, and Herkimer counties, five each. Several other counties have from one to four mills each. In estimating the value of woollens made in this state, it should be borne in mind, that notwithstanding the numerous fixed establishments for the manufacture of this article, household or family manufactures of wool and cotton are still carried on to a great extent. By the state census of 1825, the following articles were made in families during the preceding year.

	Value per Yard.	Amount, Doll.
2,918,233 yards of fulled cloth.....	1 dollar.....	2,918,233
3,468,000 yards flannel and other woollens not fulled.....	0.20 cents.....	693,600
8,079,992 linen, cotton, and other cloths.....	0.15 cents...	1,211,998

In 1835, Mr Pitkins reckoned that woollens alone were manufactured in families to the amount of at least 4,500,000 dollars annually. Now, if we allow the manufacture of linen, cotton, and other cloths, to have risen to 1,500,000 dollars, which is a fair estimate, this will make the total amount of domestic articles made in families six millions of dollars.

The following are some of the other manufactures of New York, not included in the general summary, namely, wool and fur hats made and finished in this state, estimated at 3,500,000 dollars annually; boots and shoes, deducting leather, 3,000,000 dollars annually; leather, cloth, and fur caps, probably 2,000,000 dollars annually. The amount of ready-made clothing is not estimated, but large establishments exist, particularly in the city of New York, and immense quantities are shipped to the southern states, and to foreign ports. Cabinet ware of every description is manufactured, not only for home consumption, but for shipment in large quantities to southern ports, South America, and the West Indies. Machinery, pianofortes, and carriages, are likewise manufactured on an extensive scale throughout the larger cities of the state. There are, besides, a multitude of smaller manufactures, such as those of gunpowder, fire-arms, chemical compounds, pigments, including white-lead and other paints, pencils, printing types, and tobacco; and others including the construction of ships and boats, chiefly for the navigation of the great lakes. The Onondaga salt-springs are situated in the town of Salina, Onondaga county, and are the property of the state. The salt is manufactured at four different villages, viz. Salina, Syracuse, Geddes, and Liverpool; and in the year 1833 the state of the manufacture was as follows: Number of manufactories, 131; number of kettles, 3309; number of gallons in the kettles, 312,795; and number of bushels manufactured, 1,838,646. Of this quantity about 103,000 bushels were made by solar evaporation. Coarse salt, of equal purity to any in the world, is also manufactured, and sold at a price which nets the manufac-

¹ By an omission in the act respecting the taking of the census of the state, the male aliens only were enumerated in 1835. The number of female aliens is estimated at 80,018, making a total of 162,337 aliens.

² This must refer only to permanent paupers, or such as are constantly in poor-houses.

New York. turer nine cents per statute bushel of fifty-six lbs.; and fine salt is sold at six cents. The trade in salt has been pushed to a considerable extent in competition with the foreign article, particularly since the reduction of the duty in 1834. During that year 1,943,252 bushels were manufactured; and in 1835 the quantity made amounted to 2,222,694 bushels.

The following table presents a view of the exports and imports of New York, for several years, each ending the 30th of September.

Years.	Value of Imports.			Value of Exports.		
	In American Vessels.	In Foreign Vessels.	Total.	Domestic Produce.	Foreign Produce.	Total.
	Dollars.	Dollars.	Dollars.	Dollars.	Dollars.	Dollars.
1821	21,926,635	1,702,611	23,629,246	7,896,605	5,264,313	13,162,547
1825	47,751,844	1,887,330	49,639,174	20,651,558	14,607,703	35,259,261
1830	33,432,098	2,191,972	35,624,070	13,618,278	6,079,705	19,697,983
1833	51,832,033	4,086,416	55,918,449	15,411,296	9,983,821	25,395,117
1835	82,783,459	5,407,846	88,191,305	21,707,867	8,637,397	30,345,264

The number and tonnage of vessels entering and departing from New York have of course increased in proportion to the trade. In 1830 there entered of American tonnage 298,434, and departed 229,341; and of foreign tonnage there entered 35,344, and departed 36,574; making a total of American and foreign which entered 333,778, and which departed 265,915 tons. In 1835 there entered of American tonnage 676,173, and of foreign tonnage 357,575, making a total of 1,033,748 tons. During the same year there departed, of American tonnage 589,855, of foreign 343,078, making a total of 932,933 tons. The value of the merchandise annually loaded and unloaded in the port of New York is estimated at from 100,000,000 to 120,000,000 dollars. The number of vessels in the port in the busy season varies from 500 to 750, exclusively of about fifty steam-packets. The total value of the imports into the United States in the year ending on the 30th of September 1832, was 101,029,266 dollars, of which no less than 53,214,402, or more than one half, were imported into New York. The value of the exports from the same place is estimated at between one third and one fourth of the total exports from the whole of the United States.

It will be seen from the above table, that the imports into this state greatly exceed the exports. This is accounted for by the fact, that whilst almost all articles of export from the western states are shipped at New Orleans, the greater part of the more valuable articles brought from foreign countries, and destined for the consumption of Ohio, Indiana, Illinois, and to some extent even of Kentucky, are principally imported into New York. The customs' revenue on the goods paying duties imported into the city of New York amounts to about thirteen millions of dollars, which is more than one half of the total customs' revenue of the entire United States. The imports comprehend an infinite variety of articles. The principal are cottons, woollens, linens, hardware, and cutlery; earthenware, brass and copper manufactures, and other articles, from Great Britain; silk, wine, brandy, and other articles, from France and Spain; sugar and coffee from the Havannah and Brazil, together with tea, spices, cochineal, indigo, dye-woods, and other articles. The nature of the principal articles of native American produce exported from New York will be seen by the following returns for the 1st of January 1833.

Ashes, pot.....barrels.....	18,241
Ditto, pearl.....ditto.....	2,356
Beef.....ditto.....	17,223
Pork.....ditto.....	29,418
Lard.....kegs.....	11,101

Butter.....kegs.....	9,286
Cotton.....bales.....	108,741
Cotton goods.....packages.....	7,545
Flour (wheat).....barrels.....	195,614
Corn.....bushels.....	93,716
Rice.....tierces.....	16,678
Tar.....barrels.....	18,537
Turpentine.....ditto.....	144,878
Hides.....number.....	169,493
Whale oil.....gallons.....	1,392,600
Soap.....boxes.....	76,981
Tobacco.....hogsheads.....	7,783

The tonnage of New York is greater than that of any other city in the world, with the single exception of London, and constitutes between one fifth and one sixth of that of all the United States put together. By a return of the 1st of January 1834, it amounted to 319,209 tons.

The following is a return of the amount of tonnage in the state in 1836. New York, 359,222, with 15,903 of steam navigation; Sag Harbour, 12,314; Buffalo Creek, 3740, with 1680 of steam navigation; Sackett's Harbour, 2236, with 280 of steam navigation; Oswego, 2040, with 406 of steam navigation; Oswegatchee, 799, with 417 of steam navigation; Champlain, 616; Genesee, 636; and Cape Vincent, 860. These facts will convey, it is hoped, a sufficient idea of the vast extent of the commerce of New York.

This state borrowed a considerable sum for the construction of its canals, particularly the Erie and Champlain Canal, which debt is in the course of being redeemed by the annual income of the state, which always greatly exceeds the expenditure. There are several funds belonging to the state, viz. the general, common school, literature, canal, and bank funds: but the general fund consists of bonds and mortgages for lands sold, loans, and other debts due to the state. For the year ending the 30th of September 1833, the finances stood as under:¹

	Dollars.
Permanent revenue for interest on bonds, bank stock, and other items.....	62,232.26 dol.
Capital,—bonds for lands, &c.....	125,917.70
Miscellaneous,—loan from the bank fund.....	83,149.83
Sundries.....	40,962.89
	312,262.68
Canal fund,—the receipts arising from tolls, auction duty, salt duty, interest on deposits, and other items.....	1,804,433.64
Carry over.....	2,116,696.32

¹ From Williams's New York Annual Register for 1834.

New York.

Dollars.

Brought over.....	2,116,696.32
Common school fund,—capital in bonds for lands, bank-stock, &c.....	140,985.14 dol.
Revenue from interest on stock.....	109,117.77
	250,102.91
Literature fund,—capital in bonds for lands, and various kinds of stock.....	12,155.00
Revenue from interest on stock, &c.....	22,577.22
	34,732.22
Bank fund,—capital.....	95,381.48
Revenue.....	3,954.79
	99,336.27
Total receipts.....	2,500,857.72
The payments made during the same period were permanent appropriations, such as expenses of government for salaries, and other necessary outlays....	332,041.67
Special appropriations, and temporary expenses.....	73,949.98
On account of canal fund.....	1,798,213.05
Common school fund.....	113,238.36
Literature fund, dividends to academies, &c.....	10,470.96
Bank fund, salaries of bank commissioners.....	4,500.00
Loan to the general....	83,149.83
	87,649.83
Total amount of warrants on the treasury...	2,415,563.85
Balance.....	85,293.87

From the large annual receipts obtained from tolls, auctions, sales of lands, and other items, the property of the canals, it is expected that the canal debt will be paid off long before the time fixed on for redeeming the whole of the stock.

Banks and insurances, army and navy.

In 1829 an act was passed requiring every bank thereafter to be created or renewed, to contribute annually one half of one per cent. on its capital to a fund intended for the payment of the debts of such banks as may at any time become insolvent. These banks are placed under the supervision of commissioners, to whom they are required to make annual reports of their condition, and are called "safety-fund banks." In 1830 there were thirty-seven banks in New York state, having a capital of 20,083,353 dollars. In 1836 there were eighty-seven banks, and two branch banks, which stood thus: Specie funds, 670,363 dollars; specie, 7,221,335; capital, 31,881,460; circulation, 16,427,963; and deposits, 22,000,000 of dollars. The whole of these banks, with the exception of seven or eight, are safety-fund banks. There are, besides, nine savings banks, having a total capital of 3,855,517 dollars. In the city of New York there are thirteen marine insurance companies, with a capital of 4,550,000 dollars; and twenty-eight fire insurance companies, with a capital of 10,250,000 dollars. In the other parts of the state there are about twenty-two insurance companies, with a total capital of above four millions of dollars. In 1835 there were 1687 post-offices in the state of New York, and the amount of postages for the preceding year was 430,426 dollars, of which 192,493 dollars were for the city of New York alone. In 1834, the military establishment (militia) of New York stood thus, viz. horse artillery 1687, cavalry, 7080, artillery 11,669; infantry, including riflemen, 164,979; companies of artillery attached permanently, or for inspection, 3032; total number of men, 178,447. There are five vessels of war employed in ordinary at New York.

Religion.

The constitution of this state secures toleration of reli-

gious worship, so that every denomination is to be found in it. The following is a statement of the number of the clergy of different denominations in 1835: Presbyterians and Congregationalists, 562; Methodists, 492; Baptists, 442; Episcopalians (one bishop), 181; Dutch Reformed, 116; Lutherans, thirty; Associate Reformed, twenty-three; Roman Catholics, one bishop and thirty-five ministers; Universalists, upwards of twenty; Unitarians, eight; New Jerusalemites, five; Shakers, two societies; Jews, three synagogues; the Friends, a considerable number of societies; besides various other denominations not enumerated in this list, as well as a number of licentiates and candidates belonging to those given, particularly to the Presbyterians. The clergy are supported by subscription, contribution, rents of pews, income from funds, and other sources. The salaries in the city of New York vary from 1000 to upwards of 3000 dollars. The average annual salaries of the clergy of this state are estimated as not exceeding 500 dollars each. The state of the theological seminaries in 1836 was as follows:—General theological seminary of the Protestant Episcopal church in the United States, located in New York, instituted in 1819, four professors, eighty students, and 3880 volumes in the library; the Presbyterian theological seminary at Auburn, Cayuga county, instituted in 1821, four professors, fifty-one students, and 4500 volumes in the library; the Hamilton literary and theological seminary (Baptist), at Hamilton, Madison county, instituted in 1829, eight instructors, 124 alumni, eighty-three students, and 1600 volumes in the library; the Hartwich theological seminary (Lutheran), at Hartwich, Otsego county, instituted in 1816, two professors, nine theological and a number of academical students, and 1000 volumes in the library; and the Oneida institute of science and industry (Presbyterian), near Utica, about fifty students and 1000 volumes in the library. The Baptist college at Brockport, Monroe county, the Methodist academy, White Plains, Westchester county, and a conference seminary belonging to the same sect at Cazenovia, Oneida county, and the Genesee Wesleyan seminary, Lima, Livingston county, also belong to the list of religious institutions. Amongst these may be included the American Bible Society, which has its seat in the city of New York, where a spacious building has been erected for it; the United Missionary Society, instituted at New York in 1817; the American Home Missionary Society, instituted at the same place in 1826; together with several missionary, tract, Sunday school, and other religious societies, which have various ramifications throughout the state. The benevolent institutions are upon a very extensive scale. There are asylums adapted to almost every case of human deprivation and misery; for the deaf and dumb, the blind, the orphan, the widow, the indigent, the aged, and the stranger. In 1834 their number, including religious benevolent societies, was forty-eight, and since then they must, like every thing else, have increased. It may be mentioned, that temperance societies flourish better in New York, and some of the other states, than they seem to do in any other part of the world.

Education.

Since the establishment of the state government, great exertions have been made by the legislature to extend the means of education to all classes of the community. The appropriations made for this purpose, including the capital and income of the common school and literature funds, amount to above six millions of dollars. The common schools are amongst the most important and interesting institutions in the state. Every town is divided into a suitable number of school districts, in each of which a school-house has been erected, and is provided with furniture and fuel at the expense of the district. The following notices are derived from the Annual Report of the superintendent of common schools, made in January 1835.

New York.

Dollars.

Interest at six per cent. on 2,116,000 dollars invested in 9580 school-houses.....	186,960-00
Annual expense of books for 531,240 scholars at fifty cents each.....	265,620-00
Fuel for 9580 school-houses, at ten dollars each....	95,800-00
Public money derived from the school fund.....	100,000-00
Ditto derived from local funds belonging to some towns.....	18,538-56
Ditto levied by taxation on the property of the people.....	197,615-37
Amount paid for teachers' wages, besides public money.....	398,137-04

Making the total expense of these schools in 1834..... } 1,262,670-97

The number of children actually receiving education is one in every 3-95 of the whole population. Complaints are made by the superintendent of these schools, of the incompetency of teachers, from the smallness of the remuneration which they receive. The rate of wages, however, is regularly advancing, and competition will gradually cure the evil which exists in this well-organized system of education. By a report of the regents of the university, made in 1833, there were in the state of New York sixty-five incorporated academies, which had 4856 students. The whole state is divided into eight districts, to each of which are apportioned 1250 dollars out of the income of the literature fund, making a total of 10,000 dollars given annually for the support of these institutions. There are also in New York above twenty Protestant and four Roman Catholic free schools, several infant schools, and a number of female and other seminaries of education supported by private individuals, the enumeration of which would form but a dry catalogue of names.

There are six colleges in this state, including the University of New York. The following is the return for 1836: University of New York, established in the city of that name, founded in 1831, seventeen instructors, and 226 students; Columbia College, New York (Episcopalian), founded in 1754, eleven instructors, 1620 alumni, 100 students, 8000 volumes in the college library, and 6000 volumes in the students' library; Union College, Schenectady, founded in 1795, ten instructors, 1600 alumni, 308 ministers, 268 students, 5350 volumes in the college library, and 8920 in the students' library; Hamilton College, at Clinton, founded in 1812, seven instructors, 270 alumni, sixty-nine ministers, 101 students, 2500 volumes in the college library, and 3700 volumes in the students' library; Geneva College, at Geneva (Episcopalian), founded in 1823, seven instructors, eighteen alumni, nine ministers, twenty-two students, 820 volumes in college library, and 1150 in the students' library. There is, lastly, the Hamilton Literary and Theological College, which we have already noticed in connection with religious institutions. There are four medical schools, viz. the College of Physicians and Surgeons, at New York, having seven professors, and 158 students; the College of Pharmacy, of the city of New York; the College of Physicians and Surgeons, at Fairfield, with five professors, and 190 students; and the Geneva Medical College, at Geneva, having six professors, and sixty-eight students. The other medical institutions are, the Medical Society of the State of New York; the New York State Vaccine Institution; the Kappa Alpha Phi Society; the New York Eye Infirmary; the Albany County Medical Society; the Medical Society of the City and County of New York; besides a Lunatic Asylum, the New York Hospital, and two or three other hospitals and asylums. There appear to be no law schools, but there are the New York Law Student's Association, instituted in 1833 for purposes of mutual discussion on subjects con-

nected with the legal profession; also the New York Law Institute, established in 1828, for much the same purpose as the preceding, and likewise in order to form a large library of law-books. In 1834 there were 2650 physicians and surgeons, and 2052 attorneys and counsellors in this state.

There are numerous literary and scientific institutions in New York. The principal public libraries, besides those already mentioned, are, in the city of New York, the New York Society Library, 25,000 volumes; New York Mercantile Library, 11,400 volumes; New York Apprentices' Library, 10,800 volumes; New York Historical Society Library, 10,000 volumes; New York Law Institute Library, 2100 volumes; and the Albany Library, 8000 volumes. The principal institutions are, the New York Historical Society, established in 1809, which, besides its library, has a valuable collection of coins and medals; the New York Athenæum, established in 1824, for the promotion of science and literature; the Lyceum of Natural History, established in 1818, and which possesses a valuable library and museum of natural history; the New York Literary and Philosophical Society; the American Academy of Fine Arts, established in 1808; the American Lyceum, formed in 1831, for the diffusion of useful knowledge; the National Academy of Design, established in 1826; the Clinton Hall Association, established in 1830, for the cultivation and promotion of literature, science, and the arts; and the New York Sacred Music Society, established in 1823. In the city of Albany, besides the library mentioned, there are, the Albany Institute, established in 1829, the museum of which, besides a considerable library, contains above ten thousand specimens in geology, mineralogy, and botany, with coins, engravings, casts, and other articles of vertu; the Athenæum, established in 1827, in connection with the Albany Library; and the Northern Institute and Academy of Fine Arts, established in 1831. In the county of Rochester, there are the Rochester Athenæum, established in 1830, for promoting literature, science, and the arts; the Franklin Institute of Rochester, established in 1830, for the same purposes as the preceding; and the New York State Lyceum, formed at Utica in 1831. The other principal institutions are, the New York Chamber of Commerce; the General Society of Mechanics and Tradesmen of the city of New York; the American Institute of the city of New York, for promoting the interests of agriculture, commerce, manufactures, and the arts; the New York Board of Trade; three Horticultural Societies; the Linnæan Botanic Garden, and other gardens; the New York State Society of the Cincinnati; the Merchants' Exchange Company, two typographical, and some other associations. There is a law journal published once a month at New York. In the same city there are issued, of literary and miscellaneous journals, two quarterly reviews, one every two months, six monthly, one every fortnight, and two weekly periodicals in English, and two in French, together with a republication of the Edinburgh Review and some of the leading journals of Europe. At Albany there is one magazine, and at Schenectady another. Of religious journals there are thirteen published in the state, mostly at New York, and in general monthly. There are also three or four agricultural, horticultural, and temperance publications; the total number of journals published in 1834 being forty. In 1810 there were only sixty-six newspapers published in New York; in 1834 they had increased to 267, of which number twenty-one were daily papers.

In each county of this state a jail is established by law. Previously to 1824 jails were very badly managed, but an examination which took place during that year led to the formation of the Prison Discipline Society, "an institution," says the American Almanac for 1836, "which has already

New York. been productive of the most important and beneficial effects with respect both to the condition and character of the prisoners, and the well-being of society." All the penitentiaries, with the exception of that at Auburn, were so constructed and managed as to render them only schools of vice and crime; but the object of this society is so to improve prisons in construction and discipline as to produce, as far as possible, the reformation of prisoners. The system adopted is that known by the name of the Auburn plan, and its principal features are, solitary confinement at night and during meals, and combined labour at other hours of the day; religious instruction, particularly on Sunday; and absolute silence amongst the prisoners at all times. The cells are so constructed as to answer the various ends which the society had in view. During the hours of labour the prisoners are employed in workshops, or in the prison yard, in parties of a convenient number each. Attention is paid to health, by the complete ventilation of the small cells, where the prisoners sleep and take their meals; and, to secure the well-working of the system, every violation of the rules laid down is punished by solitude, darkness, or such other infliction as may be found necessary to enforce obedience. The eighth report of the society speaks with confidence of the "favourable moral results;" and observes, on the whole, in regard to the state prisons, that there is great cause for congratulation and thankfulness. By the same report there are stated to be in prison at Auburn 876 individuals; and the balance of profits in favour of the prison, arising from the earnings of the prisoners, is stated at between eight and nine thousand dollars. The Mount Pleasant state prison, Westchester county, is likewise an admirable establishment, and in excellent condition; as is also that at Sing Sing. The mode of supporting the poor, which, in America, has been found most economical, and best calculated to discourage pauperism, is that of maintaining them in county poor-houses. The former law of settlement, and the practice of compulsory removals, have been abrogated, and a simple rule of settlement, founded principally on the residence of the party, and a summary mode of settling disputed questions, substituted in their stead. The following is an abstract taken from Williams's New York Register for 1834: "Reports have been received from all the organized counties in the state, fifty-five in number. All these counties have erected poor-houses, with the exception of six; and thirty-seven counties have abolished the distinction of town and county poor. The practical operation of our present poor-house system demonstrates satisfactorily, that it has a decided advantage on the score of economy over every other existing mode of supporting indigent persons; and that the expense of the system, in proportion to the number of paupers supported, is regularly diminishing." The annual expense of supporting each pauper is stated at thirty-two dollars twenty-one cents. The total number of paupers in the state relieved or supported during 1832-33 was 35,777, of whom only 2252 were town paupers. The aggregate expense of relieving and supporting the whole number was 295,239.15 dollars. There are attached to the poor-houses in the state 5776 acres of land; and the aggregate value of all the establishments amounts to 865,770 dollars, of which the New York city establishment has 248 acres of land, valued at 550,000 dollars. The number of paupers permanently in the poor-houses of the state will be found in the census of the population.

Miscellaneous.

It is scarcely necessary to state, that mails and stages pass between New York and the large towns of the state, and also of the Union generally. Their number is commensurate with the demands of a large mercantile city, and the wants of civilized life. The lines of packets from the port of New York for foreign parts are numerous, including those to Liverpool, London, Belfast, Havre, Ja-

VOL. XVI.

maica, Carthage, and Mexico. The principal lines of New York. packets between New York and other ports of the United States comprise those to Charleston, Savannah, New Orleans, Mobile, Apalachicola, Darien, Baltimore, Washington, Philadelphia, Boston, New Haven, Salem, and the principal ports to the east. There are lines of packet-boats on the Erie Canal, and steam-boats without number plying on all the waters of this state. On the river Hudson, where steam-navigation was first tried, it is common for one steam-boat to tow ten other boats laden with goods.

By the amended constitution of this state, adopted in the year 1821, the legislative power is vested in a senate consisting of thirty-two members, and a house of representatives consisting of 128 members, all of whom receive three dollars per diem for their services. The senators, who must be freeholders, are elected for four years; but the members of assembly are elected annually. To facilitate elections, the state is divided into eight districts, each of which is entitled to four senators, one of the number being annually appointed in each district. The members of the other house are chosen by the several counties amongst whom they are apportioned, according to a rule prescribed in the constitution. The executive power is vested in a governor, who holds his office for two years. A lieutenant-governor is elected at the same time, and holds his office for the same term of years. He is president of the senate, and officiates as governor when that office becomes vacant. The franchise is exercised by every male citizen twenty-one years of age, who has been for one year resident in the state, and for six months an inhabitant of the county in which he votes. The suffrage is thus very extensive, and the number of electors is accordingly very great. In 1832 the total number of votes for governor, exclusive of scattering votes, was 323,082. Sheriffs, coroners, and county clerks, are elected by the people; but the other civil officers are generally appointed either by the governor and senate, the two branches of the legislature, or the governor alone, excepting clerks of courts, district attorneys, and some other officers, who are appointed by the courts.

The judicial establishment consists of several courts. That for the trial of impeachments and the correction of errors is composed of the president of the senate, the thirty-two senators, the chancellor, and the justices of the supreme court. It is the court of last resort, deciding upon appeals from the court of chancery, and writs of error from the supreme court, but has no original jurisdiction, excepting in cases of impeachments. Its sessions are held at the Capitol in Albany, or at the City Hall in New York. The next is the court of chancery, the powers of which are vested in the chancellor, and in eight vice-chancellors. The third is the supreme court, consisting of the chief justice and two associate judges. Lastly, there are eight circuit courts, each consisting of a single judge.

The circuits correspond, both in territory and in name, with the eight senate districts. Each of the circuit judges possesses the powers of a justice of the supreme court at chambers, in the trial of issues joined in the supreme court, and in courts of oyer and terminer, and jail delivery. There must be held in each year at least two circuit courts, and courts of oyer and terminer, in each county in the state; and in the city of New York at least four. The courts are held during as many days as the judge thinks necessary. Courts of oyer and terminer, having power to try all crimes and misdemeanours, may be held at the time and place at which any circuit court may have been appointed. The governor, with the senate, has the power of issuing commissions of oyer and terminer and jail delivery, when occasion shall require.

Besides the powers exercised in the courts of law by the circuit judges, each circuit judge (except the judge of

New York. the first circuit) within the limits of his circuit must be a vice-chancellor, and, concurrently with the chancellor, but exclusively of any other circuit judge, must have and exercise all the original jurisdiction and powers now or hereafter vested in the chancellor, in all causes and matters in equity, where the same shall have arisen within his circuit, or where the subject-matter in controversy is situated within such circuit, or where the defendants, or either of them, reside within the same, but subject to the chancellor's appellate jurisdiction. By an act of the legislature, passed in January 1831, the equity powers of the judge of the first circuit were taken away, and a separate vice-chancellor appointed for the first circuit. The superior court of the city of New York consists of a chief justice and two associates. There are courts of common pleas in each and every county of the state, which may be held (except in the county of New York) by the judges of the county courts of each of the counties in this state, or any three of them. Any three of the judges of the county courts of each of the counties (except New York) have the power to hold courts of general sessions to try all crimes excepting those punishable with death or imprisonment for life. The mayor, recorder, and aldermen, or mayor and recorder jointly, or either of them singly, may, with or without the presence of any of the aldermen, hold mayor's courts in the cities of Albany, Troy, and Hudson.

Besides the above, there are certain courts of a peculiar and special jurisdiction. Surrogates' courts have jurisdiction of testamentary cases, held by the surrogate of each county. Courts of special sessions of the peace may be held in and for the county of New York, by any three judges of the court of common pleas of the said county, of whom the first judge of the said court, the mayor, or recorder, shall always be one; and for the several counties of the state, by three justices of the peace, or by two such justices and one judge of the county courts of such county, for the purposes provided by law. The justices of the marine court in the city of New York are authorized to hold a court therein, called the Marine Court of the city of New York. Each of the assistant justices in the city of New York is required to hold a court in the said city within the ward or wards for which he is appointed. The justices of the justices' court of the cities of Albany and Hudson are authorized to hold courts therein, called respectively the Justices' Court of the city of Albany, and the Justices' Court of the city of Hudson. Justices' courts in each county are held by a justice of the peace.

The constitution of this state has been admirably framed, and not only embodies many of those safeguards usually inserted in bills of rights, but has some provisions of a peculiar character, by which public property and public institutions are secured and protected, scruples of conscience in regard to bearing arms are obviated, and ministers of the gospel or priests are excluded from all civil and military offices. The common law of England, varied from time to time by numerous acts of the colonial and state legislature, forms the basis of the jurisprudence of New York. Since American independence was established, there have been four revisions of the statute laws of state. The last, which took place in 1827-28, was the most important; and the enactment of this body of statute law, which came into full operation on the 1st of January 1830, is perhaps one of the most important events in the history of American jurisprudence.

City of New York. The capital of this state is Albany, but by far the largest and most populous city is New York, the commercial emporium of the United States. It is situated on New York Island, formerly called Manhattan Island, at the confluence of the Hudson or North River with the strait called the East River, which connects Long Island Sound with the Atlantic Ocean. It is less than twenty miles from

the western extremity of Long Island Sound on the north-New York. east, and the Atlantic Ocean on the south. The City Hall is in latitude 40. 42. 40. north, and longitude 74. 2. 8. west from Greenwich. The city and county are of the same limits, comprising the whole island, which extends from the battery on the south to Kingsbridge on the north, thirteen miles and a half. The average breadth is a mile, but in one part it is two miles and one third across; and the area of the island is about 14,000 acres. It is separated from the continent on the north by Haerlem River, which is crossed by several bridges; from New Jersey on the west by Hudson's River; from Long Island on the east by East River; and from Staten Island to the south by the bay or harbour. The island of New York is formed on a bed of rocks, generally primitive granite, with some limestone in the northern section, where there are quarries of white marble. The elevation above tide-water is very considerable throughout the whole extent, in some parts 238 feet. The general slope of the island is from west to east, and an elevated range of ground runs in this direction, which slopes towards the northern and southern parts of the island. This physical feature of the island is considered as of great importance, since it enables water reservoirs to be so located as to command the whole city at an elevated head. The harbour or bay, which is twenty-five miles in circumference, is safe and commodious, and the largest vessels may come up to the very wharfs of the city. On the bar the depth of water at high tide is twenty-seven feet, and at low water twenty-one feet; and thence to the city the channel is from thirty-five to fifty feet deep. There is a lighthouse at Sandy Hook, on the New Jersey shore, eighteen miles distant from the city; and vessels frequently anchor in the outer harbour, or Raritan Bay. The entrance to the harbour is called the Narrows, between Staten Island on the west and Long Island on the east, about eight miles from the city. There is a lighthouse on the western part of the latter island, twenty miles north-east of New York. The harbour is rarely obstructed with ice. The principal commercial business is transacted on the east side of the city, the East River being the most safe and convenient part of the harbour. The width of the East River is from one third to one half of a mile to the opposite shore of Brooklyn, on Long Island. The Hudson, or North River, is one mile in width opposite to Jersey city, and a mile and a half at Hoboken, New Jersey. The approach to New York by sea is one of the most splendid sights of the kind which the world can present. The works of nature are here on the grandest scale, and the *tout ensemble* of islands, rivers, bays, and forests of masts, with spires towering amongst the trees which shade the streets, constitute a scene as varied and interesting as can be beheld.

The principal fortifications for the defence of the harbour are at the Narrows, about eight miles from the city. But on the Long Island shore are Forts Hamilton and La Fayette; and opposite them, on Staten Island, are Forts Tomkins and Richmond. There are several small islands in the harbour; and upon those called Bedlow's and Ellis's Islands, situated on the western side, there are batteries; whilst Governor's Island, opposite to the battery, and very near the city, is strongly fortified. The Battery is situated at the south-west extremity of the city, and is handsomely laid out, being intersected with gravel walks, and tastefully decorated with shrubs and trees. Castle Garden, connected with the Battery by a bridge, is a fine promenade, and is much frequented during the summer. A telegraph is established on the heights of Staten Island, communicating by signals with one in the city. A panorama of New York presents the compact part of the city occupying the southern part of the island, and stretching along each river about three miles. It is, generally speaking, regularly built, the

New York. principal streets running north and south, and being crossed by others extending from the river on the east to that on the west. Great improvements have been made on the compact part of the city within the last ten or twelve years, the clumsy fabrics of the Dutch having given place to the more tasteful and convenient erections of modern times. The style of building with granite and marble fronts to the basements is now almost uniformly adopted in the construction of warehouses. The northern part of the city has been very handsomely laid out in wide streets and spacious avenues; and the style of building for dwelling-houses is neat, and frequently elegant.

Broadway, the most splendid street in the city, or in the United States, runs through the centre, and extends three miles in length from north to south, terminating at the Battery. It is eighty feet wide, and generally presents massive and noble buildings, including three fine churches, several large hotels, Washington Hall, the Masonic Hall, with a variety of elegant shops. From this street there is a gentle slope east and west to the rivers. The following is a summary of the principal streets in this city, from a work entitled New York as it is in 1833.¹ "Greenwich Street is wide and elegant, and runs parallel with Broadway, between that street and Washington Street, which last is a fine avenue, next to West Street, extending along the North River. Pearl Street, between Broadway and the East River, is above a mile in length, and its course is nearly in the form of a crescent, containing numerous spacious warehouses, and is the principal seat of the dry goods and hardware business. Front and Water Streets, between Pearl Street and the East River, are occupied principally by the wholesale grocers, commission merchants, and mechanics connected with the shipping business. South Street, running along the East River, contains the warehouses and offices of most of the principal shipping merchants. Wall Street runs from Broadway to the East River, and is occupied by the banks, insurance companies, merchants' exchange,² newspapers, and brokers' offices, being the seat of heavier monied transactions than any other place in America. Canal Street, running across Broadway to the Hudson River, near the centre of the city, is a spacious street, principally occupied by retail stores. The Bowery is a wide and extensive street, running directly north and south-east of Broadway. The third avenue, extending from the Bowery to Harlem, is macadamised, and is the principal avenue to the city from the east. Chatham Street, East Broadway, Nassau Street, Maiden Lane, Broad, Fulton, Cortland, William, Hudson, Division, Grand, and Broome Streets, deserve particular notice, as among the principal streets and avenues. The streets are generally well paved, with stone or brick side walks, and lighted at night."

In enumerating the public buildings, the first place belongs to the City Hall, which is the most prominent and important edifice in New York. It is situated in the Park, about half a mile from the Battery, and is 216 feet in length by 105 in breadth, and, including the attic story, sixty feet in height. The front and ends are built of white marble, behind it is of free-stone, and it consists of a centre building and two wings, principally of the Ionic and Corinthian

orders. The *tout ensemble* is elegant, if not splendid, and New York. the edifice reflects great credit on the inhabitants for their munificence and taste. It was commenced in 1803, and finished in 1812, at a cost of 538,734 dollars. It consists of the City Hall proper, comprising a large suite of rooms for holding the different courts of law, and which are fitted up in a rich and expensive style; and of the new City Hall, which includes the police office, and a number of offices and rooms adapted to various necessary purposes. Many of the churches are in general large, but there is nothing in their architecture, or that of the steeples, particularly requiring notice. There are above one hundred places of worship in New York, which is about the same proportion to the number of inhabitants that we find in Great Britain. Columbia College, above the City Hall, is advantageously and handsomely situated in a fine square. The edifice and grounds attached are extensive, and it possesses an estate valued at 400,000 dollars. The college contains a chapel, lecture rooms, hall, library, museum, and an extensive philosophical and astronomical apparatus. The standard of classical education is supposed to be higher here than in most of the other colleges of the Union. The University of the city of New York is projected on the broad and liberal scale of the universities on the continent of Europe, and promises to be of great advantage to the literature of the country. It is governed by a council of thirty-two members, chosen by the subscribers, together with the mayor and four members of the common council of the city. The New York Institution is a brick building, 260 feet in length by forty-four in breadth, and is appropriated to associations of literature and the fine arts, such as the Literary and Philosophical Society, the American Academy of Fine Arts, and the like. The State-prison and the Lunatic Asylum are large edifices, built of stone. The Alms-house and the Asylum for the Deaf and Dumb are also buildings of ample dimensions, built of brick. The Park Theatre is a spacious edifice, eighty feet long, 165 feet deep, and fifty-five feet high, and is calculated to contain 2400 persons. The New York Theatre, in the Bowery, displays much architectural beauty, and amongst the modern ornaments of the city stands pre-eminent. It has a front of seventy-five feet, and is 175 feet deep and fifty feet high. Besides these, there are other theatres and places of public amusement in New York. The Medical College is a conspicuous edifice; and the following are spacious buildings: Clinton Hall, the Bible Society's Depository, the American Tract Society's buildings, the Arcade and the Arcade Baths, the New York Baths, the Public Marine Bath, the Manhattan Water-works, the Exhibition Room of the National Academy of the Arts of Design, Rutgers Medical College and Public School, Masonic Hall, Orphan Asylum, Fever Hospital, House of Refuge for Juvenile Delinquents, the City Hotel, the Mansion House, the National Hotel, the Franklin House, Tammany Hotel, and several other hotels. The markets, banks, insurance offices, school-houses, and buildings for public institutions of all kinds, are quite as numerous as in British cities, the difference of population being taken into account. A number of squares have been laid out in the upper part of the city, the principal of which is Washington Square: Hudson's Square or St John's

¹ By Edwin Williams, author of the New York Annual Register.

² This, along with a considerable portion of the city of New York, was consumed by fire on the 16th and 17th days of December 1835. The following account of this destructive conflagration is from the American Almanac for 1837:—"Sixteenth. A tremendous fire breaks out in the city of New York, at nine o'clock in the evening, and is not fully suppressed till one o'clock p. m. on the 17th. It commenced near Wall Street, and destroyed most of the entire seat of the greatest mercantile transactions of the city, although comparatively but little inhabited. It was the most destructive fire that has ever taken place in the United States. The loss, according to the official report of the committee, amounted to 17,115,692 dollars. The merchandise destroyed was estimated at 13,115,692 dollars; the buildings, the number of which was 529, at 4,000,000 dollars. The Merchants' Exchange, a magnificent edifice of marble, was estimated at 150,000 dollars, and the Garden Street Church at 50,000 dollars." The places of the destroyed edifices have been supplied with buildings of the same description, with a rapidity quite unparalleled in any other country. In March 1836, Congress passed a bill for the relief of the sufferers; but no aid was solicited from abroad.

New York. Park is part of the extensive tract of land, in the north-western part of the city, belonging to Trinity Church. It comprises an area of four acres, and the square is enclosed with costly and valuable private dwellings, having St John's Church on its western side. Amongst the places of fashionable resort in the city and its vicinity may be mentioned the Battery, which extends somewhat in the form of a crescent along the southern extremity of the city, and covers an area of nearly eleven acres. This favourite promenade was originally a fortification thrown up by the Dutch, and planted with cannon, from which circumstance it derives its name. But it is now divested of its warlike appurtenances, having for many years been used as a public walk; and being shaded with trees, and constantly fanned by the ocean breezes, there is not a more agreeable or healthful retreat during the summer months. In or near the city there are a number of parks and public gardens, which are also much frequented. With regard to the buildings of New York in general, Mr Stewart observes,¹ "The churches, at least many of them, are large, but there is nothing in their architecture, or that of the steeples, particularly requiring notice. There is no building here to bear any thing like a comparison with many of the public buildings in the European capitals, such as St Martin's Church in London, the front of the Register Office in Edinburgh, or that of the Chamber of Deputies at Paris; but there are churches and public buildings in all those cities quite as deficient in good taste as any of those which I observed here. In short, my notion is, that, though there is no very fine building in the city, there is not much to hurt the eye of the fastidious; and the city is generally composed of clean-looking buildings and streets, and is regularly built." New York is divided into fifteen wards, each ward electing annually an alderman and an assistant alderman, two assessors, one collector, and two constables, who are formed into a common council of two boards. The mayor is elected annually by the joint ballot of both boards. The situation of the city is considered as very favourable to the health of the inhabitants, from the elevation of the island, and the vicinity of the ocean. The climate at most seasons is mild and agreeable, the winters being less severe than in the interior of the state, and the sea-breezes rendering the heat of summer less oppressive.

The religious, benevolent, and other institutions, the banks, insurance offices, and miscellaneous companies, the state of the press, literature, religion, and education, the manufactures, trade, commerce, lines of packets, and stages, of New York, have been already enumerated in the general account of the state, as fully as our limits will permit. There is no city in the United States, perhaps in the world, which possesses greater advantages of situation than New York, both for internal and external commerce; and these have been immensely increased by art. It is hither that merchants and traders resort from all quarters, from the shores of the Atlantic, the confines of the lakes, and the banks of the great Mississippi, with a certainty that they can dispose of their own produce, and supply themselves with every article which they require. It is at this point that the vast stream of immigration at first collects, as in a reservoir, whence in course of time it distributes its contents over the whole country. Here, too, strangers and travellers congregate as the place of departure to every part of the world, attracted by the ample facilities afforded them at fixed and short intervals. It may serve to give some idea of these to state, that there are opportunities, by regular packets, to sail to Liverpool four times a month, to Havre three times, and to London twice a month. The advantageous situation of this city naturally inclines the in-

habitants to commercial pursuits; but of late years large capitals have been invested in manufactures, which are becoming more and more objects of attention. But the probability is, that New York will long remain, in a great degree, a central point for the commerce of the United States. The numerous failures which occurred in America during 1837 have of course affected New York; but this is not the place to speculate on the causes and consequences of these casualties. One thing seems perfectly clear, that the natural resources and advantages of the United States are too vast ever to be permanently affected by the state of trade in any other country, at least for ages to come. The population of New York, and the principal cities in the state, for three periods, are as under.

	1820.	1830.	1835.
New York.....	123,706	202,589	270,089
Albany.....	12,630	24,209	28,109
Brooklyn.....	7,175	15,394	24,529
Troy.....	5,261	11,550	16,959
Buffalo.....	2,095	6,321	15,661
Rochester.....	1,502	9,269	14,404
Utica.....	2,762	8,323	10,183
Schenectady.....	3,939	4,268	6,272
Hudson.....	5,310	5,392	5,531
Poughkeepsie.....	3,401	5,023	6,281

Albany, the political metropolis, is situated on the western bank of the Hudson, 150 miles from New York, and has a position equally convenient for communication with that city and with a vast interior country. The appearance of Albany from the opposite side of the river is striking and splendid; its situation on the side of a hill is favourable for every part of it being seen, and the Capitol and public edifices are conspicuous objects. It consists of one street of very considerable length, running parallel with the river, from which the rest of the city rises abruptly. The Capitol, built upon the upper portion of Albany, on an elevated site, is 115 feet in length by ninety-eight in breadth. There are ten or twelve other public buildings, some of which are very handsome. This city is very rapidly increasing, as the population returns sufficiently indicate. The other towns enumerated in the foregoing list are also places of considerable and growing trade.

The history of New York is so closely interwoven with that of the United States generally, and the latter part of it in particular with the war of independence, and the subsequent consolidation of the country as a federal republic, that it is only necessary in this place to give a brief abstract of its early annals. That part of America to which New York belongs was discovered by Sebastian Cabot in the year 1497. He claimed the country for his sovereign, but made no effort to form settlements; nor was an undertaking of this kind attempted by the English until after the Dutch had colonized a portion of the country. It is certain that, in 1609, Henry Hudson, an Englishman, entered the bay of New York, and sailed up the river now called by his name, as far as latitude 43° north; but whether he was employed by the English government in this service, and sold the country which he thus discovered without authority, is a point not so clearly settled. English writers take this view of the case; but the Dutch historians assert that he was at the time in the service of the Dutch East India Company. At all events, the English for some time made no opposition to the settlement of the country by the Dutch, who immediately commenced

¹ Three Years in North America, by James Stuart, Esq. 1833.

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Ney.

a trade with the natives of the country. The right of the English to the territory, however, was formally recognised, by the Dutch applying for and receiving from James I. in 1620, permission "to build some cottages on Hudson's River, for the convenience of their vessels engaged in trade with Brazil." To the colony which they settled under this license they gave the name of the New Netherlands. Buildings were erected in the following year near the junction of the East and North Rivers, and a governor was appointed by the Dutch in 1629. Complaints were made by Charles I. of the encroachments of the Dutch on New England, and the states-general declared, that the settlement of New Netherlands was "only a private undertaking of the West India Company of Amsterdam." In 1664, Charles II. granted to his brother, James duke of York, "all Mattawacks, now Long Island, all Hudson's River, and all the lands from the west side of Connecticut River to the east side of Delaware Bay, together with the royalties and rights of government." James sold that part of the grant which comprehends New Jersey, and retained the remainder, which comprehends the present state of New York, a name bestowed upon it in honour of the proprietor. The states-general guaranteed the possession to him by the treaty of Breda in 1667. Previously to these transactions, however, the parties themselves had been settling the point of possession in the disputed territory itself. In 1664 the New Netherlands was taken by the English; in 1673 it was retaken by the Dutch; and in 1674 it again fell under the power of the English, to which it remained attached until the time of the revolution. The remaining portion of the history of New York belongs to that of the UNITED STATES. (R. R. R.)

NEXI, amongst the Romans, were free-born persons who had been reduced to a state of slavery for debt. By the laws of the twelve tables it was ordained, that insolvent debtors should be given up to their creditors, to be bound in fetters and cords; and though they did not entirely lose the rights of freemen, yet they were often treated more harshly than the slaves themselves. If any one was indebted to several persons, and could not within sixty days find a surety, his body according to some, but according to others his effects, might be cut in pieces, and divided amongst his creditors. The latter opinion seems the more probable, as Livy mentions a law by which creditors had a right to attach the goods but not the persons of their debtors.

NEY, MICHEL, a marshal of the French empire, and one of the distinguished generals produced by the French Revolution, was born at Sarrelouis, on the 17th of January 1769. His father had been a soldier, but, after the Seven Years' War, had retired to his native village, where he exercised the humble trade of a cooper. Young Ney received his education at a school kept by the monks of St Augustin, under whom he appears to have made considerable progress in his studies; but being fired with military ardour by the recitals of his father, he early enlisted into a regiment of hussars (*régiment du colonel-général*), where he served for some time, and was a subaltern at the commencement of the Revolution. He then attained the rank of captain, in which capacity he made his first campaigns, acting as aide-de-camp to General de Lamarche, and afterwards as adjutant-general under the orders of Kléber. This latter employment afforded him several opportunities of distinguishing himself; and, in the official reports of the time, honourable mention is made of him at the passage of the Lahn in 1795, and also at the combats of Altenkirchen, Montabaur, and Wurtzburg. On the 8th of August 1796, he took Pfortzheim, and was promoted to the rank of brigadier-general. In the campaign of 1797, he was again successful; but his horse having been killed at the combat of Steimberg, he fell into the hands of the enemy. Hoche, who admired his undaunted courage, earnestly so-

licited his exchange, and, as soon as he had obtained it, appointed him general of division. It was in this capacity that, in 1798, Ney commanded the cavalry of the army which, under the orders of Schaumbourg, executed the invasion of Switzerland. On this occasion he acted towards the inhabitants with as much generosity as circumstances would permit; and, the following year, he acquired a great reputation under Massena, particularly at the battle of Zurich. In the year 1800 he served with the army of Moreau, and greatly distinguished himself both at Moeskirch and at Hohenlinden. After the peace of Luneville, when Bonaparte wished to effect the entire subjugation of Switzerland, Ney was sent into that country with the title of minister plenipotentiary, and there conducted himself in a manner to deserve more and more the favour of his master. In 1804 he obtained the baton of marshal of the empire; and it was in this capacity that, in 1805, he gained, in Suabia, the victory which procured him the title of Duke of Elchingen. After the capitulation of Ulm, being ordered to occupy the Tyrol, he entered Innsbruck on the 7th of November, at the head of the sixth corps of the grand army, which he also commanded the following year, in the contest with Prussia. Having contributed essentially to the victory of Jena, he appeared before Magdeburg, and, by a prodigy which still remains inexplicable, he, in less than twenty-four hours, received the capitulation of that redoubtable fortress, defended by a numerous garrison. In the beginning of 1807, he obtained a signal success before Thorn, where the whole Russian army had advanced to attack him, hoping to surprise him in his winter quarters; and, at a later period, he carried the town of Friedland at the battle of that name, which terminated the war in the north of Europe. But the war in which Napoleon found himself involved, if extinguished at one point, was assiduously kept alive at others. Scarcely had he concluded a peace with the Russians at Tilsit, when he hurried away to attack the Spaniards; and Marshal Ney, with his corps d'armée, was transported from the banks of the Niemen to those of the Ebro and the Tagus. The marshal, finding himself obliged to carry on a war of posts and of chicane in Galicia, lost a great number of men in this inglorious service, and with difficulty maintained his ground till the moment when he received orders to unite his corps with that of Massena, who had been sent in order to expel the English from Portugal. But this was found to be impracticable. It was judged that the lines of Torres Vedras could not be attacked with any prospect of success; and when Massena found himself constrained to retire before the Duke of Wellington, Ney commanded his rear-guard, and, in that difficult retreat, displayed equal talent and courage. In 1812, he was recalled by Napoleon to assist in the approaching invasion of Russia, for which an army of more than four hundred thousand men had been assembled on the Vistula. At the terrible battle of Mojaïsk or Borodino, Ney commanded the centre; and it was on this occasion, amidst the carnage of a conflict unequalled in modern times, that he earned the title of Prince of Moskwa. Nor did he display less valour and firmness in the disastrous retreat from Moscow, in which his corps almost entirely perished. Napoleon, who commonly called him the bravest of the brave, then designated him, in one of the bulletins of the army, as having a soul tempered with steel. In 1813, Ney participated in the indecisive victories of Lutzen and Bautzen; but he had the misfortune to lose the battle of Dennevitz, where he was defeated by Bernadotte and Bulow, with the loss of ten thousand prisoners and eighty pieces of cannon. This event made a deep impression upon his mind. Napoleon testified the most marked displeasure; and Ney, dissembling his chagrin, returned to Paris in a sort of disgrace. Nevertheless, he was again employed in the beautiful but

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unfortunate winter campaign of 1814; and he was at Fontainebleau when Napoleon was compelled to abdicate. Ney contributed materially to bring about this event, and he was one of the first generals who submitted to the Bourbons. Having presented himself before Monsieur on the 12th of April, he said to that prince, "Your royal highness will see with what fidelity we can serve our legitimate king." He also went to pay his respects to the king at Compiègne, and was there most favourably received. Louis XVIII. himself received his oath as a chevalier of the order of Saint-Louis, confirmed to him all his titles and pensions, and created him a peer of France. Marshal Ney was living at his estate of the Coudreaux when Napoleon, having escaped from the island of Elba, landed on the coast of France in February 1815; and he there received orders from the minister of war to repair to his government of Besançon. He immediately proceeded to Paris, and presenting himself before the king, made great protestations of devotion, and, kissing the hand of Louis, declared to him that he would bring back the disturber of Europe in an iron cage. He then set out for the eastern frontier, assembled some regiments at Besançon, and placing himself at their head, proceeded towards Lyons. At Lons-le-Saulnier, however, he learned that Napoleon had already entered Lyons; and from this time great agitation manifested itself amongst the troops. Nevertheless, the marshal himself still appeared faithful to the king, and even exerted himself to calm the excitement which prevailed amongst the troops; but in the night between the 13th and 14th of March, an emissary sent by General Bertrand brought him proclamations and letters from Napoleon, who made him brilliant promises, and styled him, as formerly, the bravest of the brave. The marshal could not resist the seductions of his old master, and next day he read to the troops his famous proclamation, beginning with these words: "The cause of the Bourbons is for ever lost. It is the Emperor Napoleon, our sovereign, who is alone entitled to reign." His whole conduct during the hundred days was a consequence of this step. Napoleon sent him as extraordinary commissioner to survey the frontiers of the North, and also appointed him a member of his chamber of peers. In the short but decisive campaign of Waterloo, he displayed none of the military qualities for which he had been distinguished, except courage. At Quatre-Bras he acted with unaccountable hesitation, paralysing a force sufficient to turn the scale on either side, but which, in reality, effected nothing of the least importance. After the defeat of the French army at Mont St Jean, he returned to the capital, and in the chamber of peers gave a most alarming picture of the disaster which had befallen it. When Paris capitulated, Ney, having no hopes of finding favour with the Bourbons, took refuge in Auvergne, where he was arrested in consequence of the ordonnance of the 24th of July, in which he was described as one of the authors of the revolution of the 20th March. Being conducted to Paris, he was confined in the Conciergerie, subjected to several interrogatories, and at length brought before a court-martial, composed of marshals of France and lieutenant-generals, to whose competency he objected. His counsel insisted much upon this point, in which they were ultimately successful; the members of the court being glad to escape from an embarrassing position, by pronouncing their own incompetence to try the prisoner. By an ordonnance of the king, Ney was then brought before the court of the peers, whose competency was not disputed. But his counsel remonstrated warmly against the expressions employed by the ministers, who had declared that it was "in the name of Europe" that they demanded his trial; and the same learned persons appealed with much force and eloquence to the conditions of the capitulation of Paris, which guaranteed to all

who were within the walls of the capital that they should neither be disturbed nor sought after on account of their political conduct. All their efforts to save their client were, however, unavailing. After fifteen sittings, Marshal Ney was condemned to death, on the 6th of December 1815, by a majority of 160 to 119; and the following day the sentence was carried into execution. Having received all the consolations of religion from the curate of Saint-Sulpice, he was shot by a platoon of veterans, near the palace of the Luxembourg, where he had been condemned, and displayed in his last moments the same heroic courage which had so often distinguished him in the field of battle. His body was given to his friends, and conveyed to the cemetery of Père la Chaise, where his tomb may now be seen. Marshal Ney and Colonel Labédoyère were the only victims of a revolution where it is evident that neither played the principal part, and that both were led away by the force of circumstances, and the spell which Napoleon exercised over the minds of the officers as well as the common soldiers of the army. (A.)

NEYER, a district of Hindustan, in the province of Cutch, situated about the twenty-fourth degree of north latitude, and bounded on the south-east by the fenny tract called the Runn. The country has been but imperfectly explored, and is of an arid and sandy nature, being intersected by no streams or rivers. Water is procured from deep wells, which in many seasons afford but a precarious supply. The inhabitants are generally thieves and depredators. The country abounds in horses of a very superior quality, which enables the plundering rajpoots to extend their ravages far and wide. The Coolies, also, who inhabit this tract, are very curiously armed with a curved stick like the blade of a sabre. This is burnt and made extremely hard, and thrown to the distance of 120 yards, at which distance they can break a man's leg, or kill him if they strike him on the head.

NGANCHAN, a city of the first rank, in Koeitchoo, being situated in a mountainous country, which, owing to the rudeness of the inhabitants, is in an unimproved state. Long. 105. 31. E. Lat. 26. 12. N.

NGANLO, a town of China, of the first rank, in Hou-quang, being situated on the river Han, in an extensive and fruitful plain. It carries on a considerable trade. Long. 111. 24. E. Lat. 31. 14. N.

NHING-KOUE, a city of China, of the first rank, in the western part of the province of Kiangnan, being situated in a mountainous and woody country, abounding in medicinal plants. It has considerable manufactures of paper. Long. 118. 24. E. Lat. 31. 2. N.

NIAGARA, a large river of North America, to which belong the most magnificent water-falls in the world. The river, forming part of the boundary line between New York and Upper Canada, runs from Lake Erie into Lake Ontario, thus connecting the St Lawrence and Lake Ontario with the upper lakes. It is thirty-five miles in length, and is from half a mile to several miles in breadth. There are many islands in the Niagara, all the way to the falls, and close above them; but the principal island is about half-way between the village of Black-Rock and the falls; it is called Grand Island, and contains about 17,000 acres. The river is about two miles and a half in width below Grand Island, and there the current increases; but it becomes more contracted on its way to the falls. The rapids succeed, which are swift currents, occasioned by great descents of the river, tumbling perpendicularly, in some places six, eight, and ten feet, over ledges of rock, the whole descent being about sixty feet. From Fort Erie on the Canada shore, at the outlet of Lake Erie, to Chippewa (eighteen miles), the bank is from four to ten feet high. From Chippewa to the Great Fall, two and a half miles along the Canada shore, there is a descent of ninety-

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Niagara. two feet, and the bank is from ten to one hundred feet in height. The river is here so rapid, that notwithstanding its great depth, it is always covered with a white foam. From the cataract to Lewiston is seven miles; and near this place the bank is 310 feet high, being composed of strata of soft mud and sand, clay, gypsum, slate, limestone, and a superstratum of earth. From Lewiston to Lake Ontario is seven miles, and in this distance the northern terrace or mountain ridge crosses the course of the river. The height of the bank then diminishes to twenty-five or thirty feet. The difference of level between Lakes Erie and Ontario, forming the whole descent of the river, is 334 feet. The Niagara affords a great variety of fish, such as sturgeon, bass, muscanunge or muscalunga; and salmon-trout are numerous below the falls. The white fish, weighing from two to six pounds, are taken in seines, from October to May.

The stupendous Falls or Cataracts of Niagara are situated about half way between Lakes Erie and Ontario. Although mere description can convey no adequate idea of the momentum of the Niagara, some notion of it may be formed when we reflect that the descent above the falls is about sixty feet in half a mile; that the column of water is three quarters of a mile in breadth and twenty-five feet in depth; and that it is propelled onward, not only by its own gravity, but by the weight of the whole surplus waters of the immense inland seas of North America. Two small islands, Bath Island and Goat Island, intervene on the American side, very near the falls, and separate the river into two branches, the great mass of water descending by the more direct and wider channel on the western or Canada side, by what is called the Horse-shoe Fall. A portion of the fall on the American side is cut off by a small island on the precipice; the rest descends in one vast body, almost perpendicularly, from a height of 164 feet, its breadth being about 220 yards. Both the falls on the American side are crossed by bridges. The Horse-shoe Fall is several feet less in height; but it far surpasses the other in grandeur. Its breadth is estimated at 600 yards, and seven eighths of the waters of the river are supposed to pass over it. This great body of water sweeps over the precipice with such tremendous force that it forms a curved sheet, which strikes the surface of the water beneath fifty feet from the base of the precipice, so that visitors may venture to pass behind this watery wall. The best points of view are from the Table Rock, which projects and looks over the falls; and here the cataracts on both sides may be seen at once. But the rapids are beheld to the greatest advantage from Goat Island, to which a very ingeniously constructed and strong rough bridge has been thrown on the American side, over great blocks of rock and rapids. The river is crossed by a small boat about two hundred or three hundred yards below the falls, where it is about 1200 yards in breadth. There is a steep wooden stair from the landing-place to the top of the bank on the American side; and from thence, by the bridge over the rapids, already mentioned, Goat Island may be readily approached. "On the north side of that island," says Mr Stuart, "the rocks, projected into the river, two hundred or three hundred feet immediately over the falls, are accessible by a rough wooden bridge, below which the water runs with fearful velocity. From these rocks, the view over the precipice and great fall is terrific, absolutely appalling, although the prodigious magnitude of the tumbling water is not so apparent at this spot as from the Table Rock and the boat." A spiral stair-case conducts to the edge of the river below the Table Rock, and from a point a little way nearer the falls than the foot of the ladder there is an excellent view. "The overwhelming sensations," continues the traveller above named, "with which a spectator can hardly fail to be affected, are produced by the immense flood,

not less than one hundred millions of tons of water per hour, the stupendous mass, and overpowering force of the roaring and falling waters. It is, in truth, a great deep ocean thrown over a precipice nearly 160 feet high. Every thing, every surrounding object, is viewed with indifference, whilst the mind is wholly absorbed in the contemplation of a spectacle so sublime, surpassing in majesty, and grandeur, and power, all the works of nature which have ever arrested the attention, or presented themselves to the imagination. No just or adequate description can be conveyed by language. Such words as grandeur, majesty, and sublimity, fail altogether to express the feelings which so magnificent a sight, exceeding so immeasurably all of the same kind that we have ever seen or imagined, excites." Mr Stuart gives just praise to the following description of Mr Morris, an American minister, which appears to be as simple, plain, and intelligible as a mere verbal picture of the spectacle can be. "To form," says this individual, "a faint idea of the cataract, imagine to yourself the Frith of Forth rush wrathfully down a steep descent, leap foaming over a perpendicular rock 175 feet high, and then flow away in the semblance of milk from a vast basin of emerald." The great volume of water, as we have said, inclines very much forward in its descent, and it falls, for the most part, in an unbroken sheet of a dark-green colour, until it meets a cloud of spray ascending from the rocks below, in which it is lost to the eye. This cloud of vapours, the "everlasting incense of the waters," as it has been finely designated, rises a hundred feet above the precipice, and can be seen at the distance of seventy miles. Prismatic colours are always present, and complete rainbows, sometimes three at a time, of the most brilliant hues, are not unfrequently "set in the cloud." The thunder of the cataract can be distinctly heard at ten miles from the falls, and in favourable states of the wind and atmosphere at even twice that distance. With regard to the height of the fall, there is a discrepancy amongst authorities, some calling it 150, others 160, and a third class of writers carrying it up as far as 176 feet. It appears to us that some calculate from the surface of the column of water, some from its medium depth, and some from its base, just as it bends over the incurvated precipice. This view of the matter reconciles them all, the largest number answering to the top of the column of water, and the lesser numbers to its average depth and the height of the precipice. The Niagara is usually frozen over during a part of the winter, except at the falls, and where the rapids are most violent. At this season of the year, myriads of wild ducks alight on the foaming stream above the falls, and, sailing on the bosom of the cataract until it reaches its extreme circular verge, at about half its descent, rise aloft into the air amidst the spray of the "phlegethon" below, wheel round to the place on the rapids whence they began their descent, and again perform with ease and for pastime what bids defiance to the utmost power and ingenuity of man. (R. R. R.)

NIAGUR, a town of Hindustan, belonging to the Nag-poor Mahrattas, and situated in the province of Gundwana, twenty-eight miles north-north-west from Ruttunpoor. Long. 82. 11. E. Lat. 22. 22. N.

NIAS ISLE. See NEAS ISLE.

NICANDER, a Greek physician of the empirical sect, and also a poet and grammarian, was a native of Colophon, and, according to some authors, had been a priest of Apollo at Claros in Ionia. The date of his birth is uncertain; but it is probable that he died about a century before the commencement of our era. His father's name was Damnaeus, and he was sometimes called an Ætolian, because he appears to have lived during many years in Ætolia, and to have written a history of that country. This physician occupied himself much with materia medica and pharmacy, and composed his works in verse. The greater part of his

Nicander. writings, however, which are said to have been numerous, is no longer extant. One of his poems, entitled *Georgica*, which he dedicated to Attalus III. the last king of Pergamus, is cited with commendation by Cicero in his treatise *De Oratore* (lib. i. c. 16). In some others of his lost works, which were also in verse, he appears to have described the various poisons and their antidotes; at least such is the statement of Eustathius and Athenæus. Of his various poems two only remain; the *Theriaca* and *Alexipharmaca*.

The *Theriaca*, though composed without critical discernment, contains, nevertheless, some remarkable facts in natural history. In it may be found an exact but somewhat prolix description of the combats of the rat of Pharaoh, or mangouste (*viverra ichneumon*), with the serpents, the flesh of which is eaten by that quadruped with impunity. The author also treats of scorpions, which he divides into nine species; a division adopted by some modern naturalists. His description of the *amphisbæna* accords with that which has been given by Linnæus in his *Amœnitates Academicæ* (tom. i.). Then follow some very curious observations on the effects of the poison of different kinds of serpents, each of which produces different phenomena. Nicander thought he had ascertained that the poison of serpents is concealed in a membrane surrounding the teeth; an opinion which is not very far from the truth. He describes a species of serpent which always takes the colour of the soil on which it crawls, and which he denominates $\sigma\eta\psi$. He was the first who distinguished night-butterflies from those which are seen only during the day; and to the former he gave the name of *phalænæ*, which they still bear. This poem contains a great number of popular fables, which, however, were all firmly believed at a period when the science of natural history was in its infancy. Thus we find it gravely stated that wasps are produced by the putrefied flesh of horses. As to the poem entitled *Alexipharmaca*, it may be considered as a continuation of the preceding. The effects of poisons are there explained with tolerable accuracy. They are divided into animal, vegetable, and mineral; but under the last head Nicander only mentions white lead, and litharge, which is also an oxide of lead.

Of these two works there have been numerous editions. The first, which is in folio, was published at Venice in 1499; and the next, in quarto, appeared at Cologne in 1530, with an interpretation of the *Theriaca*, and various commentaries on the *Alexipharmaca*, by an anonymous annotator. Of both there have been various Latin translations, some into prose and others into verse; but the principal are those of Lonicer, Cologne, 1531, in 4to; Erycius Cordus, Francfort, 1572, in 4to; Jean de Gorris, Paris, 1549, in 8vo; and Pierre-Jacques Stève, Valence, 1552, in 8vo. Lastly, the works of Nicander were translated into French by Jacques Grévin, Antwerp, 1567, 1568, in 4to. In the Imperial Library at Vienna there is a beautiful manuscript copy of both poems, ornamented with figures of venomous animals, and accompanied by a commentary from the pen of the sophist Euteichnius, which has been printed in the Greek edition of Nicander published by J. G. Schneider, Halle, 1792, in 8vo. Demetrius Phalereus, Theon, Plutarch, and Diphilus of Laodicea, all wrote commentaries upon the *Theriaca*; and there are still extant learned Greek *scholia* on both poems, which Vossius has ascribed to Diphilus, though upon what authority we know not. Besides the poems above mentioned, Nicander also wrote in verse *Ophiaca*, or a treatise on serpents; *Hycinthia*, or a collection of remedies; and a commentary on the Prognostics of Hippocrates. He was likewise the author of five books of Metamorphoses, some verses of which have been preserved by Tzetzes; and he wrote in prose several historical works, one of which, being the history of

Colophon, is cited by Athenæus, whilst the others mentioned are accounts of Ætolia, Bœotia, Thebes, and a general description of Europe. This Nicander has sometimes been confounded with a grammarian of the same name, a native of Thyatira; and Vossius, in giving the titles of the works written by both, has not been careful to distinguish clearly their respective productions. Mérian, in his essay on the Influence of the Sciences on Poetry (see Memoirs of the Royal Academy of Berlin for 1776), cites the works of Nicander, as affording evidence of the incongruity which exists between the language of poetry and the nomenclature of science; and stigmatizes the author of the *Theriaca* as a therapeutic versifier, who wrote lines for the apothecaries, and a mere grinder of anecdotes, who sung of toads, scorpions, and spiders. In the *Bulletin de Pharmacie* for 1810, however, M. Cadet de Gassicour has given an analysis of the works of Nicander, affording materials for a more accurate judgment than the exaggerated and burlesque representations of Mérian. (A.)

NICANDRO, Sr, a city of the kingdom of Naples, in the province of Capitanata. It stands on the river Gargano, and contains 7090 inhabitants.

NICARAGUA, one of the five states which compose the republican confederation of Central America. It is bounded on the south by Costa Rica and by the Pacific Ocean; on the north by Honduras; on the west by the Pacific Ocean; and on the east by the Mosquito shore, which is washed by the Carribbean Sea. From north to south it extends about seventy-five leagues, and from west to east about eighty-five. That elevated mountain range which forms the spine of the whole continent, called in South America the Andes, and in the United States the Stony Mountains, may be traced throughout Central America, although at a smaller elevation than in the two adjoining continents, dividing this country into two grand portions; the waters on the north of the ridge falling into those of the Atlantic, and those on the south running into the Pacific. This range has in Central America no determined name, and in many parts is even without a visible existence. It may almost be said to be interrupted in its course by two transverse valleys, in one of which is contained the Lake of Nicaragua, and in the other the plain of Comayagua. "But this interruption," says Colonel Galindo,¹ "is more apparent than real; for to the southward of the lake there certainly exists an elevation, which separates its waters from the Pacific; and in the extensive valley of Comayagua, the only one of the union which runs north and south, there is decidedly a central eminence, on each side of which the waters drain off to the respective oceans." In the state of Nicaragua, the mountain chain inclines close to the borders of the Pacific, leaving the lakes on the east. The climate of this state is hot, and it yields excellent grapes and other fruits, cocoa, indigo, cotton, the gum called *cavana*, and various medicinal drugs. But the productions of the cold or temperate zones, such as wheat, do not thrive, and the soil is not favourable for breeding sheep. Immense herds of cattle, however, are pastured in the large grazing farms, for the consumption not merely of the province, but also of the city of Guatemala.

The most remarkable feature of this province consists in its numerous rivers and immense lakes. The Lake of Nicaragua, the largest sheet of water in Central America, is about 150 English miles in length, and about sixty in breadth. It has almost everywhere a depth of ten, and sometimes of fifteen fathoms, with a muddy bottom, except along the shore, where there is clear sand. This vast basin receives a number of rivers; but the only visible outlet to its waters is the river St John, which flows into the Atlantic, and forms about thirty considerable falls before

Nicandro,
St
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Nicaragua.

¹ Journal of the Geographical Society of London, vol. vi. part ii. 1836.

Nicaragua. it reaches the marshy shores of the ocean. On the north-west it communicates with the Lake of Leon or Managua (upwards of fifty miles in length and nearly thirty in breadth) by means of a navigable channel called the Rio Tapitapa, about twenty miles in length. With regard to the grand canal by which it is proposed to connect the Atlantic with the Pacific through the Lake of Nicaragua, the following is the most recent information on this very interesting and most important subject.¹ "It would be an important service rendered to geography, would any person endeavour to ascertain the levels on this line of road, and the physical obstacles it would be necessary to overcome to form a water communication. It is believed that some such survey has been set on foot by the government, or by a company of the United States. In the mean time, the only observations we have are from a Spanish manuscript existing in the archives at Guatemala, and copied by Mr Thomson,² which states that the engineer Don Manuel Galisteo executed a survey in the year 1781, by means of a water-level, from the Gulf of Pagagayo, in the Pacific, as far as the Lake of Nicaragua; and that, by 347 levels, at about 100 yards apart, the surface of the lake was found to be elevated 133.11½ feet above the sea. But the lake is said to be fifteen fathoms deep, so that its bottom is still forty-six Spanish feet (one Castille foot is 0.9267 of an English foot) above the level of the South Sea. The distance between the lake and the sea, at the proposed communication, is, by this measurement, only 29,880 English yards, or fifteen geographical miles nearly, and the greatest actual height of any part of the land is nineteen feet above the level of the lake. Thus we are assured of a grand natural reservoir of water at a sufficient elevation. But the practicability of communication with the Pacific, either by this line or through the Lake of Leon, or with the Atlantic by the Rio San Juan, or some great transverse valley, is not yet ascertained with any certainty. The coast-line has hitherto been very imperfectly laid down on our maps; but the recent survey of Captain Owen, R. N. now in progress, will doubtless remedy this for the northern coast." It is also expected that the survey of Captain Beechey, R. N. on the coast of Peru, will reach this coast, and correct the errors which exist in all the maps of it that are to be met with. With regard to the undertaking itself, it appears to us insignificant, when compared with some of those which are frequently engaged in and successfully accomplished by the Americans of the United States, where canals sometimes five hundred miles in length are cut, and not unfrequently to a considerable extent through the solid mountain rock. We have no doubt that ere long this speculative and enterprising people will set this great work on foot, which will doubtless cause a revolution in the commercial world, and prove of incalculable utility to it. There are a number of islands on the Lake of Nicaragua; but the only one inhabited is Ometepe, and it is also the only one on which a volcano is found. This lake is subject to violent agitations from tempestuous gales of wind. The lakes, rivers, and coasts, both on the Atlantic and Pacific Oceans, furnish an inexhaustible supply of various kinds of fish. The surrounding country is well wooded, and much valuable timber, affording dye-woods and gums, is found in the forests; amongst these may be mentioned the dye-wood which is known by the name of the state. Some of the most populous villages of Nicaragua are likewise found in its vicinity.

Of the numerous volcanic eruptions which have taken place in Central America, one of the most appalling on record is that of the volcano of Cosiguina, situated in Nica-

ragua, near the eastern promontory of the Bay of Concha-Nicaragua, which separates the waters of the gulf from the Pacific. This took place in January 1835; and as no convulsion of the kind ever occurred before on the same spot, it was quite unexpected. On the 16th and 17th of that month, continued noises were heard at a great distance all round, and were supposed at first to be caused by artillery; but during the following ten days, the violent earthquakes, the fall of showers of pumice-stone and ashes, and the deep darkness which overspread the country and the contiguous sea for many leagues, pointed out the true cause. The official report from the city of Leon states, that there, and in the department of Granada, "the catastrophe was not perceptibly felt until the dawn of the 25th, when the eruption developed itself to such a degree that the sky was darkened, and continued to deepen till eleven in the morning, when the district was enveloped in the most fearful darkness, terrific reports being at the same time heard, and showers of calcined lava being precipitated over the whole face of the country." In other parts of the state, the same train of phenomena occurred, accompanied with the loudest thunder and the most vivid lightnings, together with violent convulsions of the earth. Two islands and a number of shoals were formed in the sea; the river Chiquito, which flowed towards the north-west, was completely choked up, and another river made its appearance flowing in an opposite direction. Two farms, along with a great quantity of live stock, were destroyed; and within the limits of the eruption there were afterwards found the remains of all kinds of quadrupeds and birds. Few of the human species, however, perished; and the damage done was inconsiderable, considering the tremendous nature of the eruption, an idea of which may be formed from the fact, that the sound was heard and ashes fell at Jamaica, more than 800 miles from Cosiguina. At sea, clouds of dust were discovered floating at a far greater distance from the scene of the catastrophe.

The city of Leon, the capital of the state, is situated in a savannah, about eight leagues from the western shore of the Lake Leon, and four leagues from the shores of the Pacific, in latitude 12. 20. north, and longitude 86. 16. west. It was originally founded in 1523, on the spot now called Old Leon, but was rebuilt on its present site a few years afterwards. Previously to the revolution it was populous, and rapidly increasing in prosperity; but, along with the whole of the state, it suffered severely in that struggle, and has not yet recovered from its effects. Four leagues to the north-west of Leon, on the shores of the Pacific, is the town of Realejo, inhabited entirely by Ladinos, who are chiefly employed in ship-building. The harbour, formed by a large and beautiful river, is excellent, and capable of containing 1000 vessels commodiously. The conveniences for ship-building are great, as timber, cordage, sail-cloth, pitch, and tar may be procured to an almost unlimited extent. The supply of masts is also inexhaustible. The town was built in 1534, by the companions of Alvarado, in his expedition to Peru, who, observing the advantageous situation of the harbour, determined to establish themselves on a spot so convenient and promising. At a short distance is the village of the Viejo, where the corregidores formerly resided, on account of the salubrity of its situation. The principal place in the vicinity of the Lake of Nicaragua is the town of Granada. This city was founded in the year 1523. It stands on the north-western shore, in an advantageous position for commerce (latitude 11. 30. north, and longitude 86. 21. west), being distant from Leon about thirty leagues. This place contains about 6000 inha-

Journal of the Geographical Society of London, vol. vi. part ii. 1836.
² Thomson's Visit to Guatemala in 1825, London, 1829.

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bitants. The town of Nicaragua, situated twelve leagues south-east of Granada, is inhabited by the descendants of Spaniards, who carry on a traffic in cocoa. But the place which is said to carry on the largest trade is Masaya, situated at the bottom of a deep rocky dell. The situation of this village was certainly ill chosen; water is very scarce, and the inhabitants are compelled to bring it up in pitchers from a well of extraordinary depth. Besides, at a short distance from Masaya is the volcano of the same name, now indeed extinct, but at the time of the conquest known by the name of the *Infierno de Masaya*; and the light of the lava constantly boiling up in the crater might be perceived at sea twenty-five leagues. Not far from this there is another volcano, called *Nindiri*, from which an eruption took place in 1775, when "the torrent of lava that rolled into the Lake of Masaya destroyed the fish, and heated the lands which it traversed to so great a degree that all the cattle feeding on them perished." The only other places of any consideration in the state are *Segovia Nueva*, situated on the river *Yare*, near the confines of *Tegucigalpa*, thirty leagues north of Granada; *Esteli*, *Acoyapa*, *Villa Nueva*, *Subiana*, a very populous Indian village contiguous to the city of *Leon*, and *Nicoya*. The cities, towns, and villages in Nicaragua, and the other states of Central America, have municipalities, the members of which are annually elected, and the *alcaldes* or chief justices preside. Each of the states is governed by a chief. The inhabitants are chiefly Roman Catholics, but the monkish orders have been wholly extinguished, and the few nunneries which remain cannot compel their members to stay in them against their will. In 1836 Colonel Galindo estimated the number of inhabitants at 120,000 Indians, 110,000 whites, and 120,000 *Ladinos*; the total being 350,000 souls.

Nicaragua was the first province subdued by the Spaniards, having been discovered and partially settled by *Gil Gonzales Davila* and his companions in 1522. It takes its name from a powerful *cacique*, who was one of the first to enter into amicable relations with the Spaniards, and submit to baptism. The indigenous natives of Nicaragua speak five different languages. The *Chorotec* seems to be that of the principal indigenous tribe. It bears no kind of affinity with the Aztec or Mexican, which had been rendered common, previously to the arrival of the Spaniards, by the invasion of an Aztec colony. These new comers used a species of hieroglyphical figures for the communication of ideas, but the *Chorotecs* would seem to have been ignorant of writing. They reckoned eighteen months in the year, and had an equal number of great festivals. Their idols were honoured with a sanguinary worship like those of Mexico, and their women were liable to be offered in sacrifice, although otherwise they exercised considerable power. The Spaniards, on their arrival, discovered palaces and spacious temples, and found some expert workers in painter's gold. The bulk of the people, however, were in a state of barbarism and abject misery. (R. R. R.)

NICARIA, an island of the archipelago, between *Samos* and *Tine*, about fifty miles in circumference. A chain of high mountains, covered with wood, runs through the middle, and supplies the country with springs. It produces wheat, barley, figs, honey, and wax.

NICASTRO, a city of the province of *Calabria Ulteriore*, in the kingdom of *Naples*, being situated on the river *Polito*, in a district abounding in olives, and yielding rice, wheat, and other corn, with excellent wine. It is surrounded with walls, and contains 6100 inhabitants.

NICE, a part of the continental dominions of the king of *Sardinia*, and usually distinguished as a countship. It extends in east longitude from 6. 27. to 7. 51. and in north latitude from 43. 45. to 44. 28., and contains 1430 square miles. It is divided into four provinces, viz. *Nice*, *Sospello*, *Oneglia*, and *Monaco*; and it is said to contain 200,000 in-

habitants. The city of *Nice* is the capital of the countship, as well as of the province of its own name. It is situated on the shore of the Mediterranean, in the Gulf of *Genoa*, where the *Paglione* falls into the sea. It has an artificial haven, capable of containing 200 vessels, and is protected from the waves by a long mole. It is fortified both towards the land and towards the sea. It contains narrow, gloomy, and filthy streets, but, from some of the terraces on the shore, it has fine prospects towards the sea, including the hills near *Genoa*, and the distant mountains of *Corsica*. It contains a cathedral, two parish churches, fifteen monasteries, four nunneries, several oratories, and two hospitals, with 2000 houses, a few of them very magnificent, with 19,645 inhabitants. There is an extensive trade in silk, and in liqueurs, essences, perfumes, and soaps; and the fishery is a considerable source of employment. It was the birth-place of the painter *Vanloo*, and of the celebrated mathematician *Cassini*. Long. 7. 10. E. Lat. 43. 41. N.

NICEPHORUS, GREGORAS, a Greek historian, was born about the close of the thirteenth century, and flourished in the fourteenth, under the Emperors *Andronicus*, *John Palæologus*, and *John Cantacuzenus*. He was a great favourite of the elder *Andronicus*, who made him librarian of the church of *Constantinople*, and sent him as ambassador to the Prince of *Servia*. He accompanied this emperor in his misfortunes, and assisted at his death, after which he repaired to the court of the younger *Andronicus*, where he seems to have been well received; and it is certain that, by his influence over the Greeks, that church was prevailed on to refuse entering into any conference with the legates of Pope *John XXII*. But in the dispute which arose between *Barlaam* and *Palamos*, he took part with the former, and maintained his cause zealously in the council held at *Constantinople* in 1351. For this he was cast into prison, and continued there till the return of *John Palæologus*, who released him; after which he held a disputation with *Palamos*, in the presence of that emperor. He compiled the *Byzantine history* from 1204, when *Constantinople* was taken by the French, to the death of *Andronicus* the younger, in 1341; a work which is not only barbarous in style, but inaccurate in facts. This history, with a Latin translation by *Jerome Wolf*, was printed at *Basil* in 1562, and again at *Geneva* in 1615; but a more correct edition than either of the preceding is that which was printed at the *Louvre* in 1702, by *Boivin*, in two vols. folio. *Nicephorus* was the author of several other works, all of which remain inedited, excepting his *Scholia* upon the treatise of *Synesius de Insomniis*, which were published by *Turnebus* in 1553.

NICEPHORUS, *Calistus*, a learned monk of *Constantinople*, who flourished in the fourteenth century, under the Emperor *Andronicus Palæologus* the elder. He wrote in Greek an ecclesiastical history in twenty-three books, eighteen of which are still extant, and contain the transactions of the church from the birth of Christ till the death of the Emperor *Phocas* in the year 610. Of the other five books we have nothing but the arguments, which show that they embraced the portion extending from the commencement of the reign of the Emperor *Heraclius* to the end of that of *Leo the Philosopher*, who died in the year 911. This history was dedicated to *Andronicus Palæologus* the elder; it was translated into Latin by *John Langius*, and has gone through several editions, the best of which is that of *Paris*, published in 1630.

NICERON, JOHN FRANCIS, a French mathematician, was born at *Paris* in the year 1613. Having finished his academical studies, he entered into the order of the *Minims*, and took the habit in 1632; and, as is usual, he changed the name given him at his baptism for that of *Francis*, the name of his paternal uncle, who was also a *Minim*, or *Franciscan*. His inclination and taste for the mathematics ap-

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peared early during the course of his philosophical studies; and to that science he devoted what time he could spare from his other employments, after he had completed his studies in theology. All the branches of the mathematics, however, did not equally engage his attention; he confined himself particularly to optics, and only learned as much of the rest as was necessary for rendering him perfect in this branch. He has himself informed us, in the preface to his *Thaumaturgus Opticus*, that he travelled twice to Rome, and that, on his return home, he was appointed teacher of theology. He was afterwards chosen to accompany Father Francis de la Noue, vicar-general of the order, in his visitation of the convents throughout France. The eagerness of his passion for study, however, induced him to make the best use of all the moments he had to spare, and that wise economy of time furnished him with as much leisure as satisfied his love of knowledge. Being taken sick at Aix, in Provence, he died there on the 22d of September 1646, at the early age of thirty-three. He was an intimate acquaintance of Descartes, who had a high esteem for him. The principal works of Niceron are, 1. *L'Interpretation des Chiffres, ou Règles pour bien entendre et expliquer facilement toutes sortes des Chiffres simples*, Paris, 1641, in 8vo; 2. *La Perspective Curieuse, ou Magie Artificielle des effets merveilleux de l'Optique, Catoptrique, et Dioptrique*; 3. *Thaumaturgus Opticus, sive admiranda Optices, Catoptrices, et Dioptrices, pars prima*, 1646, in folio, a work to which the preceding essay was intended to serve as an introduction.

NICERON, *John Peter*, justly celebrated on account of his Biographical Memoirs, was born at Paris on the 11th of March 1685. He was descended of an ancient and noble family, which was in very high repute about 1540. He studied with success in the Mazarin College at Paris, and afterwards at the college of Duplessis. Having resolved to forsake the world, he consulted one of his uncles, who belonged to the order of Barnabite Jesuits. This uncle examined him, and not doubting his election, introduced him as a probationer to that society at Paris. He was received in 1702, took the habit in 1703, and made his vows in 1704, at the age of nineteen. After he had professed himself, he was sent to Montargis, in order to study philosophy and theology; and his superiors, being satisfied with his proficiency, sent him to Loches, in Touraine, to teach the classics and rhetoric. Here his devout behaviour and excellent conduct as a teacher made him be thought worthy of the priesthood, which he received at Poitiers in 1708; and as he had not arrived at the age to assume this order, a dispensation was obtained in his favour. The college of Montargis having recalled him, he there professed rhetoric for two years, and philosophy during four. Notwithstanding all these avocations, he was humanely attentive to every call of charity, and to the instruction of his fellow-creatures, many of whom heard his excellent discourses, not only in the pulpits of the churches within the province, but even in those of Paris. In 1716, his superiors invited him to the city, that he might have an opportunity of prosecuting with more convenience those studies for which he had always expressed the greatest inclination. He understood not only the ancient, but also the modern languages; a circumstance of infinite advantage in the composition of those works which he has given to the public, and which he carried on with great assiduity till the time of his death, which happened on the 8th of July 1738, at the age of fifty-three. His works are, 1. *Le Grand Fâbri-fuge*, or, a Dissertation to prove that common water is the best remedy in fevers, and even in the plague (translated from the English of John Hancock, minister of St Margaret's, London), in 12mo. This little treatise made its appearance, amongst other pieces relating to this subject, in 1770, and was attended with such success that it pass-

ed through three editions, the last of which appeared in 1730, in two vols. 12mo. 2. *The Voyages of John Ovington to Surat, and divers parts of Asia and Africa, containing the history of the revolution in the kingdom of Golconda, and some observations upon silk worms*, Paris, 1725, in two vols. 12mo. 3. *The Conversion of England to Christianity, compared with its pretended Reformation, a work translated from the English*, Paris, 1729, in 8vo. 4. *The Natural History of the Earth, translated from the English of Mr Woodward, by M. Nogues, doctor in physic, with an answer to the objections of Dr Camerarius, and containing also several letters written on the same subject, with a methodical distribution of fossils, translated from the English by Niceron*, Paris, 1735, in 4to. 5. *Memoirs of Men illustrious in the Republic of Letters, with a critical account of their works*, Paris, in 12mo. The first volume of this great work appeared in 1727; and the others were given to the public in succession, as far as the thirty-ninth, which appeared in 1738. The fortieth volume was published after the death of the author, in 1739. Since that period three others have been added; but in these there are many articles of which Niceron was not the author. To a work of this kind many objections may be made, according to the particular taste or views of each individual objector; and, in fact, the French critics have expatiated with much severity upon the mistakes unavoidable in an undertaking of such magnitude and difficulty. But it is much more easy to censure than to execute. Since the time of Niceron the French have produced no such collection as his, which, with all its faults, has been the foundation, as far as it goes, of all the subsequent accounts given of the same authors. (A.)

NICETAS, DAVID, a Greek historian, a native, as some relate, of Paphlagonia, who lived about the end of the ninth century. He wrote the *Life of St Ignatius*, patriarch of Constantinople, which was translated into Latin by Frederic Mutius, bishop of Termoli; and he also composed several panegyrics in honour of the apostles and other saints, which are inserted in the last continuation of the *Bibliotheca Patrum* by Combesis.

NICETAS, *Achominates*, a Greek historian of the thirteenth century, called also *Choniates*, from having been born at Chone, or Colossus, in Phrygia. He was employed in several considerable affairs at the court of Constantinople; and when that city was taken by the French in 1204, he withdrew, with a young French captive, whom he afterwards married at Nice, in Bithynia, where he ended his days in 1206. He wrote a *History, or Annals*, from the death of Alexius Comnenus in the year 1118, to that of Badouin in 1205; a work of which we have a Latin translation by Jerome Wolf, printed at Basil in 1557, and inserted in the body of the *Byzantine Historians*, printed at the Louvre.

NICHOLS, FRANK, doctor of physic, was born in London in the year 1699. His father was a barrister at law, and both his parents were of good families in Cornwall. After receiving the first rudiments of his education at a private school in the country, where his docility and sweetness of temper endeared him equally to his master and his school-fellows, Frank was in a few years removed to Westminster, and from thence to Oxford, where he was admitted a commoner of Exeter College, under the tuition of Mr John Haviland, on the 4th of March 1714. There he applied himself diligently to all the usual academical studies, but particularly to natural philosophy and polite literature, of which the fruits were most conspicuous in his subsequent lectures on physiology. After reading a few books on anatomy, in order to perfect himself in the nomenclature of the animal parts then adopted, he engaged in dissections, and then devoted himself to the study of nature, perfectly free and unbiassed by the opinions of others.

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When he was chosen reader of anatomy in that university, he employed his utmost attention to elevate and illustrate a science which had there been long depressed and neglected; and by quitting the beaten track of former lecturers, and minutely investigating the texture of every viscus, as well as the nature and order of every vessel, he gained a high and just reputation. He did not then reside at Oxford; but when he had finished his lectures, he used to repair to London, the place of his abode, where he had determined to settle. He had once an intention of establishing himself in Cornwall, and for a short time practised there with great reputation; but being soon tired of the fatigues attendant on that profession in the country, he returned to London, bringing back with him a great insight, acquired by diligent observation, into the nature of the miliary fever, and which was attended with the most salutary effects in his subsequent practice in the metropolis.

About this time he resolved to visit the Continent, partly with the view of acquiring a knowledge of men, manners, and languages, but chiefly to make himself acquainted with the opinions of foreign naturalists on his favourite study. At Paris, by conversing freely with the learned, he soon recommended himself to their notice and esteem. Winslow's was the only good system of physiology at that time known in France, and Morgagni's and Santorini's in Italy. On his return to England, he repeated his physiological lectures in London, which were much frequented, not only by students from both the universities, but also by many surgeons, apothecaries, and others. Soon afterwards, his new and successful treatment of the miliary fever, then very prevalent in the southern parts of England, added much to his reputation. In 1725, at a meeting of the Royal Society, he gave his opinion on the nature of aneurisms, in which he dissented from that expressed by Dr Freind in his History of Physic.

In the beginning of the year 1728, he was chosen a fellow of the Royal Society, to which he afterwards communicated the description of an uncommon disorder, namely, a polypus, resembling a branch of the pulmonary vein, for which Tulpius has strangely mistaken it, coughed up by an asthmatic person. He also made observations on a treatise, by M. Helvetius of Paris, concerning the lungs. Towards the end of the year 1729, he took the degree of doctor of physic at Oxford. On his return to London, he underwent an examination by the president and censors of the College of Physicians, previously to his being admitted a candidate, which every practitioner must be a year before he can apply to be chosen a fellow. Dr Nichols was admitted into the college on the 26th of June 1732; and two years afterwards, being chosen Gulstonian reader of Pathology, he made the structure of the heart and the circulation of the blood the subject of his lectures. In 1736, at the request of the president, he again read the Gulstonian lecture, taking for his subject those parts of the human body which serve for the secretion and discharge of the urine, with the causes, symptoms, and cure of the diseases occasioned by the stone. In 1739, he delivered the anniversary Harveian oration. In 1743, he married Elizabeth, youngest daughter of the celebrated Dr Mead, by whom he had five children, two of whom died young. In 1748, Dr Nichols undertook the office of surgical lecturer, beginning with a learned and elegant dissertation on the *Anima Medica*. About this time, on the death of Dr John Cuninghame, one of the elects of the college, Dr Abraham Hall was, without any apparent reason, chosen to succeed him in preference to Dr Nichols, who was his senior. With a just resentment, he immediately resigned the office of surgical lecturer, and never after attended the meetings of the fellows, excepting when business of the utmost importance was in agitation. In 1751,

he took some revenge in an anonymous pamphlet, entitled *The Petition of the Unborn Babes to the Censors of the Royal College of Physicians of London*, in which Dr Nesbit (*Pocus*), Dr Maule (*Maulus*), Dr Barrowby (*Barebone*) principally, and Sir William Browne, Sir Edward Hulse, and the Scotch incidentally, are the objects of his satire.

In 1753, on the death of Sir Hans Sloane in his ninety-fourth year, Dr Nichols was appointed to succeed him as one of the king's physicians, and held that office till the death of his royal master in 1760, when this skilful physician was superseded with something like the offer of a pension, which he rejected with disdain. The causes of the uncommon disorder of which George II. died, viz. a rupture of the right ventricle of the heart, he explained in a letter to the Earl of Macclesfield, president of the Royal Society, which was published in the *Philosophical Transactions*.

In 1772, Dr Nichols published a second edition of his treatise *De Anima Medica*, to which he added a dissertation *De motu Cordis et Sanguinis in homine nato et non nato*, inscribed to his learned friend and coadjutor Dr Lawrence.

Being at length tired of London, and also desirous of superintending the education of his son, he removed to Oxford, where he had most agreeably spent some years in his youth. But when the study of the law recalled Mr Nichols to London, he took a house at Epsom, where he passed the remainder of his life in literary retirement, not inattentive to natural philosophy, especially the cultivation of grain and the improvement of barren soils, and contemplating also with admiration the internal nature of plants, as taught by Linnæus.

His constitution never was robust. In his youth, at Oxford, he was with difficulty recovered from a dangerous fever by the skill of Drs Frampton and Frewen; and afterwards at London he had frequently been afflicted with a catarrh, and an inveterate asthmatic cough, which, returning with great violence at the beginning of the year 1778, deprived the world of this valuable man, on the 7th of January, in the eightieth year of his age.

NICHOLSBURG, a city in the circle of Brunn, in the Austrian province of Moravia. It is the municipal city of a majorat belonging to Prince Dietrichstein, which comprehends four market-towns and eight villages. There is a most magnificent palace, in a most picturesque situation, belonging to the noble proprietor, in which is a library containing 20,000 volumes. There are a minster and several other churches, with 760 houses and 7420 inhabitants, who carry on some extensive woollen and cotton manufactures, and much internal trade towards Vienna. Near to it are vineyards, yielding good wine. Long. 16. 31. 25. E. Lat. 48. 47. N.

NICIAS, an Athenian statesman, was son of Niceratus, a person of great wealth, but who seems to have taken no part in the political transactions of his country. Nicias was possessed of considerable abilities, both political and military; but he was by no means fitted to occupy the commanding position which Pericles had long filled. Yet on the death of that great man, 428 B. C., in the third year of the Peloponnesian war, Nicias was put forward by the aristocracy and the more moderate of the democratical party, as the fittest person to lead the councils of the commonwealth. He was also rather a favourite with the people, as he was liberal of his wealth for their gratification, and ever ready to assist the distressed. He was cautious, too, in all his proceedings, and avoided any thing which might excite the envy of the Athenians. He had taken no prominent part in public affairs till the death of Pericles, when the necessity of some counterpoise to the mad projects of the demagogue Cleon placed him at the head of a strong party. It shows the complete absence

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Islands.

of any commanding genius, that Nicias should have been thought of, as his diffidence in a public assembly, and his want of firmness, stood much in the way of his usefulness. The first matter in which the two parties took opposite views was the punishment that ought to be inflicted on the inhabitants of Mitylene for their rebellion. Cleon proposed and carried a decree for putting every man to death, and for reducing the women and children to slavery. This monstrous proposition was opposed by all the influence of Nicias, but passed in spite of its evident injustice. Nicias led several expeditions, and was always successful, because, as Plutarch states, he selected those commands where success was nearly certain, although the glory might indeed be small. He took the islet called Minoa, at the mouth of the harbour of Nisæa, the seaport of Megara; and he plundered the coast of Bœotia. He commanded the fleet, 425 B. C., at the time that the island Sphacteria was blockaded by the Athenians, and willingly gave up the command to Cleon, who exclaimed that if he were in that station he would engage to subdue the island within twenty days, and bring the garrison prisoners to Athens. To the great surprise of all parties, Cleon succeeded in the enterprise (Thucydides, iv. 28). The following year we find Nicias commanding an expedition which was directed against the island of Cythera, an important appendage of the Lacedæmonian territory, and which Nicias took without much difficulty. After the death of Cleon at Amphipolis, 422 B. C., there was a strong inclination on both sides to bring the war to a close; and as Nicias was the most active in promoting the measure, it was usually called the Niceian peace. The fundamental principle of the treaty was, that each party should restore what had been taken in war, except that Nisæa was reserved to Athens, in consideration of the refusal of the Thebans to surrender Plataea. It was concluded for fifty years, 421 B. C. (Thucydides, v. 18). At this time Alcibiades began to occupy himself with public affairs, and wishing to ingratiate himself with the popular party, he took the opposite side to Nicias in almost every question. It was so in respect to the peace; and as there were some articles liable to be disputed, Alcibiades soon managed to embroil matters, and war again broke forth in all its original fury, 418 B. C. An expedition to Sicily was next proposed by Alcibiades, and although it was strongly opposed by Nicias, the decree was passed, and Nicias was appointed, along with Lamachus and Alcibiades, 415 B. C., to command the troops. Matters were conducted with various success; but the Athenians were at length completely defeated, and Nicias fell into the hands of the Syracusans. The mob demanded his life, and although Gylippus the Syracusan general exerted himself to save Nicias, it was without success. When Nicias and his colleague Demosthenes heard the sentence which had been passed against them, they anticipated their fate by putting themselves to death, in the year 413 B. C. (Thucydides, vii.; Plutarch, *Life of Nicias*; Diodorus Siculus.)

NICIAS, a celebrated painter of Athens, who flourished about 322 years before the Christian era. He was universally extolled for the great variety and noble choice of his subjects, the force and relief of his figures, his skill in the distribution of lights and shades, and his dexterity in representing all kinds of four-footed animals, a branch of the art in which he excelled all the masters of his time. His most celebrated piece was that of Tartarus, or Hell, as it is described by Homer. For this picture Ptolemy the son of Lagus offered him sixty talents, or L.11,250, which he refused, and generously presented it to his own country. He was also much esteemed by all his contemporaries for his excellent talent in sculpture.

NICOBAR ISLANDS, a group of islands situated in the Bay of Bengal, between the sixth and tenth degrees of north latitude, and between the ninety-third and ninety-

fifth degrees of east longitude. They occupy the space from the north-west point of Sumatra to the most southerly of the Andaman Islands. There are seven large and twelve small islands. The principal ones are Carnicobar, Teressa, Chowry, Bombocha, Kaichull, Carmorta, Nancowry, Toulougar, Sambelong, and Nicobar or Great Sambelong; besides a multitude of smaller islands without any distinct appellation. These islands are mostly hilly, and some of the mountains in them rise to a considerable height; but others, again, are flat, and covered with cocoa-nut trees. On the other islands also a large proportion of cocoa and areca palms, with timber trees of various kinds, some of them of an enormous size, and very fit for naval purposes, are produced; and so thickly are they interwoven in some places, that they are impervious to the beams of the sun. The falling of the leaves, twigs, and fruit below, with the heavy dews, renders the island extremely unhealthy, especially to Europeans. The best island for supplies is Carnicobar; and perhaps the worst is the large one, or Great Nicobar, to the north of which runs St George's Channel; a very dangerous passage for ships, on account of the strength of the tide, and the rocks.

The wild beasts common in the Indian continent are not to be found here, such as leopards, tigers, &c. Large flocks of sheep and other cattle, originally brought hither by the Danes, and which have since run wild in the woods, are found in some of the islands; dogs and swine are also common in most of them, and being fed on cocoa-nuts, the quality of the pork is excellent. In some of the southernmost islands monkeys are found. Snakes also abound, but they are not so numerous nor so venomous as those on the coast of Coromandel. There are numerous alligators, some of them of large size, and a variety of crabs, which swarm everywhere. Shell-fish are found in such numbers, that the most beautiful collections of shells may be made here. The inhabitants appear, from their features and their figure, to belong to the Kalmuck race. They are of a copper colour, and have small eyes, small flat noses, large mouths, thick lips, and black teeth. They are well made and muscular, and are of a lively disposition, resembling the Piguans and Chinese in features, having scarcely any beard. Their mode of living is rude. They dwell in huts of an oval form, covered with cocoa-nut leaves, and supported on posts about five or six feet from the ground. These huts are always circular, resembling a stack of corn. They gain their subsistence chiefly by fishing, and trading to the neighbouring islands; whilst the women are employed in preparing the victuals, and in cultivating the ground. Vessels touching at these islands are abundantly supplied with cocoa-nuts, pine-apples, plantains, lemons, and other fruits, and also with ducks and fowls; all of which they readily exchange for cloth, tobacco, and any kind of cutlery; but they do not appear to set much value on gold and silver, such metals not being current amongst them, and tobacco being the ordinary medium of all barter and exchange. A considerable traffic is carried on amongst the islands, the chief articles of which are cloth, silver coin, iron, tobacco, and some other commodities, which they obtain from Europeans. The chief productions of these islands are the cocoa-nut and areca-nut trees. Wild cinnamon and sassafras also grow in them; and there is, besides, a nutritive fruit resembling in some respects the jaca fruit of Bengal, and growing on a species of palm which is found in abundance in the woods. The country is divided into villages, consisting of ten or twelve huts, each of which has a captain, who carries on a bartering trade with the ships that arrive, but who has no peculiar privileges. The clothing of the men is somewhat peculiar, consisting of a narrow piece of cloth about three yards long, which they wrap round their waists, and then pass between their legs, and through the girth behind, leaving the end of it to drag after them; a circumstance which

Nicobar
Islands.

Nicodemus.

has given rise to the fabulous stories of men with tails related by Kioping, a Swedish navigator.

The religion of the natives is an absurd and unintelligible superstition, consisting of sorceries, conjurations, and other delusions practised on the ignorant multitude by the priests. Their language is remarkably poor in words; and the missionaries never having been able to acquire any considerable knowledge of it, have not succeeded in making many converts.

These islands were first settled by the Danes in 1756, for the purposes of commerce, and from that people they received the name of Frederic's Islands. But, owing to the unhealthiness of the island, almost the whole colonists died. A new attempt was made in 1768, in conjunction with the Baptist missionaries; but in 1771 only two Europeans and four Malabar servants survived. The missionaries still persevered in their attempts to effect a settlement on the islands, and received supplies from Tranquebar, both of provisions and of recruits. But the mortality continued unabated; and no progress having been made in the conversion of the natives, the attempt was finally abandoned in the year 1787. The missionaries mostly died of fevers and obstructions of the liver.

NICODEMUS, a disciple of Jesus Christ, one who was a Jew by nation, and by sect a Pharisee. The Scripture calls him a ruler of the Jews, and our Saviour gives him the name of a master of Israel. When our Saviour began to manifest himself by his miracles at Jerusalem, at the first passover which he celebrated there after his baptism, Nicodemus made no doubt but that he was the Messiah, and came to him by night, that he might learn of him the way of salvation. Jesus told him, that no one could see the kingdom of heaven except he should be born again. Nicodemus, taking this in the literal acceptation, asked, "How can a man be born when he is old? Can he enter the second time into his mother's womb and be born?" To this Jesus replied, "Except a man be born of water and of the Spirit, he cannot enter into the kingdom of God. That which is born of the flesh is flesh, and that which is born of the Spirit is spirit." Nicodemus asked him, "How can these things be?" Jesus answered, "Art thou a master of Israel, and knowest not these things? We speak that we do know, and testify that we have seen, and ye receive not our witness. If I have told you earthly things, and ye believe not, how shall ye believe if I tell you of heavenly things? No one hath ascended up to heaven but he that came down from heaven, even the Son of man, who is in heaven. And as Moses lifted up the serpent in the wilderness, even so must the Son of man be lifted up. For God so loved the world, that he gave his only begotten Son, that whosoever believeth on him should not perish, but have everlasting life."

After this conversation Nicodemus became a disciple of Jesus Christ, and there is little doubt that he went to hear him as often as our Saviour visited Jerusalem. It happened, however, that the priests and Pharisees had sent officers to seize our Lord; but they, returning to their employers, reported, that never man spoke as he did. To this the Pharisees replied, "Are you also deceived? Have any of the rulers or of the Pharisees believed on him?" Upon this Nicodemus thought himself obliged to make answer, saying, "Doth our law judge any man before it hear him, and know what he doeth?" To this they replied, "Art thou also of Galilee? Search and look; for out of Galilee ariseth no prophet. After this the council was dismissed. At last Nicodemus declared himself openly to be a disciple of Jesus Christ, and he came along with Joseph of Arimathea to pay the last duties to the body of Christ, which they took down from the cross, embalmed, and laid in a sepulchre.

We are told that Nicodemus received baptism from the

disciples of Christ; but it is not mentioned whether this was before or after the passion of our Lord. It is added, that the Jews being informed of the circumstance, deposed him from his dignity of senator, excommunicated him, and drove him from Jerusalem; but that Gamaliel, who was his cousin-german, took him to his country-house, and maintained him there till his death, when he was honourably interred near St Stephen. There is still extant an apocryphal gospel under the name of Nicodemus, which in some manuscripts bears the title of the Acts of Pilate.

NICOLAIEV, or NICOLAIEF, a city of Russia, in the province of Cherson. It stands on the river Bug, at about eight leagues from the entrance of that river into the Black Sea, and at the point where the river Ingoul falls into it. From the entrance of the Bug at Oczakow, up to this city, its depth in the mid-channel is from four to six fathoms, and the navigation is consequently safe for the largest ships. This place is one of the chief naval arsenals on the Black Sea, and, besides ships of war, many gun-boats, with sails and oars fit for navigation, are built and equipped. The timber for ship-building comes chiefly by the Dnieper to Cherson. The admiral commanding in chief in the Black Sea, and a number of inferior officers, have their permanent residence at this place. The town is much scattered; its streets are wide and regular, and many of them are planted with trees on both sides, but scarcely any of them are paved. Almost all the houses are built of stone, and separated from each other by trees and gardens; but scarcely any of them are of a large size, and few have any pretensions to magnificence. The climate is healthy, the air is pure, rents are moderate, provisions are cheap, and the society is good; but fuel is scarce, and water is conveyed from a very copious fountain near the gates of the city. The principal public buildings are a new church in the great square, the guild-hall, the admiralty, the docks, the custom-house, the marine barracks, and the hospital. There is a school for naval instruction and for the education of the artillery, and a fine astronomical observatory. The number of inhabitants is now about 15,000, the greater part of whom are connected with the marine service. The observatory is situated in longitude 32. 0. 15. E. and latitude 46. 59. N.

NICOLAITANS, in ecclesiastical history, Christian heretics, who assumed this name from Nicholas of Antioch, who, being a Gentile by birth, first embraced Judaism, and then Christianity, when his zeal and devotion recommended him to the church of Jerusalem, by whom he was chosen one of the first deacons. Many of the primitive writers believe that Nicholas was rather the occasion than the author of the infamous practices of those who assumed his name, and who were expressly condemned by the Spirit of God himself (Rev. ii. 6). Their opinions and actions were indeed highly extravagant and criminal. They allowed a community of wives, and made no distinction between ordinary meats and those offered to idols. According to Eusebius, they subsisted but for a short time; yet Tertullian says that they only changed their name, and that their heresies passed into the sect of the Cainites.

NICOLAS, St, a large market-town of the Netherlands, situated in the province of East Flanders, and arrondissement of the Dender. It is well built, has a fine market-place, and is in one of the richest agricultural districts of that rich country, where husbandry is better conducted than in almost any part of Europe. It has 11,500 inhabitants, many of whom are employed in making cloths and cotton goods, in distilleries, and in various other branches of manufacture.

NICOLAS, St, an island of the Atlantic Ocean, and one of the most considerable of those of Cape Verd, being situated between St Lucia and St Jago. It is of a trian-

Nicolaiev
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Nicolas, St.

Nicole. gular figure, and about seventy-five miles in length. Long. 33. 35. W. Lat. 17. 0. N.

NICOLE, PETER, a celebrated French moralist and theologian, the nephew of Claude Nicole, a French poet, and one of the most illustrious writers of the Port-Royal, was born at Chartres in October 1625. His father, John Nicole, having a perfect knowledge of the ancient languages, instructed him in the elements of grammar, and initiated him so thoroughly in the classics, that at the age of fourteen he had completed his preliminary studies, and read the best works in Greek and in Latin. He then proceeded to Paris, where he commenced a course of philosophy and theology, and at the same time applied to the study of Hebrew; but the weakness of his sight, occasioned by excessive application, obliged him to abandon this pursuit, in which he had already made great progress. Having completed his course of theology, and received the degree of bachelor, he was preparing to take his license, when the troubles which broke out in the university, on the subject of the famous propositions of Jansenius, forced him to defer the accomplishment of this object. Being attached by gratitude and esteem to the inmates of the Port-Royal, he passed several years in that house, occupied in teaching the belles-lettres. But, in 1655, he returned to Paris to labour under the direction of Dr Arnauld, with whom he was united by the ties of the most intimate friendship; and, desiring to live altogether unknown amidst the bustle of the capital, he took the name of Rosny. The advancement of Jansenism appears to have furnished the motive that induced him to undertake a journey which he made into Germany, in the course of the year 1658; and whilst there, he not only translated into Latin the *Lettres Provinciales*, in the composition of which he had participated, but published them, accompanied with very virulent notes. He soon returned, however, to join Arnauld; and they retired together to Châtillon, where they applied themselves to the preparation of different writings. Nicole, although he did not entirely adopt the opinions of the Jansenists, made frequent excursions to Port-Royal, Paris, and the neighbouring provinces, in the interest of that party; but in these he acted with extreme circumspection, not choosing, as he himself observed, to play any part in civil wars. Being warmly solicited by his friends to enter into holy orders, he at length resolved to demand ordination of the Bishop of Chartres, in whose diocese he resided. But that prelate refused to ordain him, no doubt by reason of his connections with the Port-Royal. He continued undisturbed at Paris until the year 1677, when a *Lettre*, which he wrote in the names of the Bishops of St Pons and Arras, on the laxity of the casuists, raised such a storm against him, that he was obliged to withdraw from the capital. For some time he remained concealed in the environs of Chartres and of Beauvais; but the death of the Duchess of Longueville, the most ardent protectress of Jansenism, having decided him to quit France, where he did not consider himself as any longer safe, he left the kingdom, and took refuge successively at Brussels, the Abbey of Orval, and Liège, frequently changing his name and the place of his retreat, and believing himself incessantly exposed to the machinations of his enemies. At length, by the intercession of M. de Harlay, the archbishop of Paris, he obtained permission to return secretly to Chartres, and soon afterwards to fix his residence at Paris, where he resumed his ordinary occupations; and it was then that he completed his *Essais de Morale*, a work which is less read than esteemed, and which stamped his reputation as a writer. In the last years of his life he mingled in the dispute about Quietism, and took the part of Bossuet against Fénelon, but with wisdom and moderation. Having for some time been deprived of the use of his hands, he was meditating alone in his cabinet when he was

suddenly struck with apoplexy. The tidings soon spread in the capital, and the crowd of persons who hurried to visit the pious cenobite proved the high consideration which he enjoyed. Racine, being reconciled to his master, came in a diligence, bringing a medicine (*gouttes d'Angleterre*) which for a moment revived him; but the resuscitation was soon succeeded by a relapse, and he died two days afterwards, on the 16th of November 1695, at the age of seventy. He had given orders that he should be interred without any ceremony; but his will, in this particular, was not respected, and his remains were accompanied to the grave by the most distinguished men of the time.

Nicole, being of a simple and ingenuous character, evinced during his whole life the timidity of an infant. Nothing was more easy than to embarrass him in discussion; an objection which he had not foreseen entirely disconcerted him. Speaking of Tréville, one of his friends, he said, "Tréville beats me in the chamber; but before he reaches the foot of the stair I confute him." In the last year of his life he seldom went abroad, being afraid that, in passing along the streets, a tile would fall upon his head. He had also a great dread of travelling, and particularly of aquatic excursions. During a long period he had relegated himself to the faubourg Saint-Marcel; and when asked the reason of this, he replied, "It is because the enemies who menace Paris will probably enter by the gate of Saint Martin, and consequently will be obliged to traverse the whole city before reaching the place where I live." But, with all this simplicity and timidity, Nicole had a reach and an accuracy of thought which were altogether admirable. He equalled the best dialecticians, in the order, the method, the sequence, and the depth of his ideas; but as his object in all his works was rather to prove than to please, his style, although remarkable for its purity and clearness, often fatigues by its dryness and monotony. "On quitte ses *Essais* sans peine," says Palissot; "on y revient sans plaisir, parce que les lecteurs ont besoin d'être flattés." Nicole attempted panegyric, but soon found that he had no talent for a species of composition which requires invention and warmth of style.

A list of the works of Nicole will be found in the *Mémoires* of Niceron (tome xxix.), at the end of his Life by the Abbé Goujet, and also in the Dictionary of Moreri. The following are the principal, viz. 1. *Epigrammatum Delectus ex omnibus tum veteribus tum recentioribus Poëtis, cum Dissertatione de vera Pulchritudine*, Paris, 1659, in 12mo; 2. *La Perpétuité de la Foi de l'Eglise Catholique, touchant l'Eucharistie*, Paris, 1664, in 12mo, called *la Petite Perpétuité*, to distinguish it from the great work which bears the same title; 3. *Traité de la Foi Humaine*, Paris, 1664, in 4to, a work in which Arnauld had some share; 4. *Les Imaginaires et les Visionnaires, ou Lettres sur l'Hérésie Imaginaire*, Liège, 1667, in two vols. 12mo; 5. *La Perpétuité de la Foi de l'Eglise Catholique, touchant l'Eucharistie*, Paris, 1669-1676, in three vols. 4to, a masterpiece of reasoning, which appeared under the name of his friend Arnauld; 6. *Essais de Morale, et Instructions Théologiques*, Paris, 1671-1672, in twenty-five vols. 12mo; 7. *De l'Unité de l'Eglise, ou Réfutation du Nouveau Système de Jurieu*, Paris, 1687, in 12mo. The last writings of Nicole turn upon the system of general grace, which he supported, to the no small displeasure of most of his friends. The consequence was a controversy, which appears to have produced some coldness on both sides. Arnauld, in his *Letters* (tome vii.), expresses himself with much force on the subject; and Quesnel complained warmly to Nicole of this species of defection on his part. The various pieces produced in this dispute will be found in a collection of writings on general grace, published by Fouillon in 1715, with a long preface; and a curious analysis of the *Traité de la Grace Générale* will be found in the *Bibliothèque* of the Dictionary of Richelet

Nicole.

Nicomedes Nicole had a large share in the *Méthodes Grecques et Latines*, and also in the excellent treatise on Logic, known under the name of the Port-Royal. The life of this able and laborious writer has been written by the Abbé Goujet, who is, however, more of a panegyrist than a biographer; by Besoigne, in his *Histoire de Port-Royal* (tome iv.); and also by Saverien, in his *Vies des Philosophes Modernes* (tome i.). (A.)

NICOMEDES, the name of several kings of the ancient Bithynia. See the article BITHYNIA.

NICOMEDIA, the metropolis of Bithynia, which was built by Nicomedes, the grandfather of Prusias. Nicomedia was famous, not only under its own kings, but also under the Romans; it was the royal residence of Diocletian, and also, if we may credit Nicephorus, that of Constantine whilst Constantinople was building. It is situated at the bottom of a bay of the Propontis, in Asia Minor, and still bears the ancient name. Long. 30. 0. E. Lat. 41. 20. N.

NICOMEDUS, a geometrician, celebrated on account of the invention of the curve called conchoid, which is equally useful in resolving the two famous problems of doubling the cube and trisecting the angle. It appears that he lived soon after Eratosthenes, for he rallied that philosopher on the mechanism of his mesolabe. Geminus, who flourished in the second century before Christ, has written on the conchoid, though Nicomedus was always esteemed the inventor of that curve. Those who place him four or five centuries after Christ must be ignorant of these facts, by which we are enabled to ascertain approximately the time at which he lived.

NICOPOLIS, a province of European Turkey, which extends in north latitude from 42. 44. to 43. 46. and in east longitude from 23. 30. to 26. 4. This district is naturally fertile; but agriculture is in a neglected state, and the chief product is cattle. The capital, of the same name, is situated on the Lower Danube. It is fortified, and connected with a strong citadel, and it is said to contain 10,000 inhabitants. It is the seat of a Catholic and also of a Greek bishop.

NICOSIA, a city of the island of Sicily, in the kingdom of Naples, and in the province of Demone, eighty miles from Palermo. It stands on the ridge of a rocky mountain, the Herbita of antiquity. It is an ill-built city, and suffers from a scarcity of water; but as the situation is more healthy than that of many of the Sicilian cities, it contains a population of 12,060 inhabitants, occupying 3167 houses, many of which are formed by excavations in the rocks. Near to it are two springs of fossil oil, a copious rock-salt mine, and several sulphureous baths.

NICOT, JOHN, seigneur of Villemain, and master of the French king's household, was born at Nismes, and sent in 1559 as ambassador to Portugal, whence he brought the plant which, from his name, was called *Nicotiana*, but is now more generally known by the name of *tobacco*. He died at Paris in the year 1603. Nicot wrote a French and Latin dictionary, in folio; a Treatise on Navigation; and some other works.

NICOTERA, a city of the province of Calabria Ulteriore, in the kingdom of Naples. It stands on the sea-coast, at the mouth of the river Mesina, is the seat of a bishop, and has a cathedral, with several other churches. It suffered by the earthquake of 1783; but has been since restored, and now contains 6250 inhabitants, who follow chiefly the fisheries, and cure large quantities of anchovies and sardinias.

NICOTIANA, or TOBACCO, a plant so called from Nicot

above mentioned. There are seven species of *nicotiana*, *Nicotiana*, of which the most remarkable is the *tabacum*, or common tobacco plant. This was first discovered in America by the Spaniards about the year 1560, and by them imported into Europe. It had been used by the inhabitants of America long before, and was called by those of the islands *yoli*, and by the inhabitants of the continent *pæton*. It was sent into Spain from Tabaco, a province of Yucatan, where it was first discovered, and from which it takes its common name. Sir Walter Raleigh, it is generally said, first introduced it into England about the year 1585, and taught his countrymen how to use it. Dr Cotton Mather, however, in his *Christian Philosopher*, says, that in the above year one Mr Lane brought over some of it from Virginia, which was the first time it had ever been seen in Europe. Tobacco is commonly used by the oriental nations, though it is uncertain by whom it was introduced amongst them. Considerable quantities of it are cultivated in the Levant, on the coasts of Greece and the Archipelago, in Italy, and also in the island of Malta.

There are two varieties of that particular species of *nicotiana* which is cultivated for common use, and which are distinguished by the names of *Orinoko* and *sweet-scented tobacco*. They differ from each other only in the figure of their leaves, those of the former being somewhat longer and narrower than those of the latter. They are tall herbaceous plants, growing erect with fine foliage, and rising with a strong stem from six to nine feet in height. The stalk near the root is above an inch in diameter, and surrounded with a kind of hairy or velvet clammy substance of a yellowish-green colour. The leaves are rather of a deeper green, and grow alternately at the distance of two or three inches from each other. They are oblong, of a spear-shaped oval, and simple; the largest being about twenty inches long, but decreasing in size as they ascend, till they come to be only ten inches long, and about half as broad. The face of the leaves is much corrugated, like those of spinage when fully ripe. Before they attain maturity, when they are about five or six inches in length, the leaves are generally of a full green, and rather smooth; but as they increase in size they become rougher, and acquire a yellowish cast. The stem and branches are terminated by large bunches of flowers, collected into clusters, of a delicate red, the edges, when full blown, inclining to a pale purple. They continue in succession till the end of the summer, when they are succeeded by seeds of a brown colour and a kidney shape. These are very small, each capsule containing about 1000; and the whole produce of a single plant is reckoned at about 350,000. The seeds ripen in the month of September.

The following extract, which is copied from a manuscript of Dr Barham,¹ containing directions for raising, cultivating, and curing tobacco in Jamaica, is perhaps worthy of the attention of those who wish to be further acquainted with this subject.

"Let the ground or woodland wherein you intend planting tobacco be well burned, as the greater the quantity of wood ashes the better. The spot you intend raising your plants on must be well strewed with ashes, laid smooth and light; then blow the seed from the palm of your hand gently on the bed, and cover it over with palm or plantain leaves.

"When your plants are about four inches high, draw them and plant them out about three feet asunder; and when they become as high as your knee, cut or pluck off the top; and if there are more than twelve leaves on the plant, take off the overplus, and leave the rest entire.

¹ This gentleman was contemporary with Sir Hans Sloane. He was a man of great probity, an able physician, and a skilful naturalist. He collected and arranged a number of the plants of Jamaica, which he presented to Dr Sloane, and made several communications to the Royal Society.

Niebuhr. *schrieber*,¹ at Mildorf in Holstein.² If he had retained his taste for distant enterprise and adventure, the East was the theatre upon which alone he would have sought to indulge such a predilection; but the attachment which he had conceived for his wife, and the birth of two children, presented insuperable obstacles to the execution of any project of this kind. He therefore remained in the bosom of his family, occupied with the preparation of his travels, and intent only upon giving to his children useful lessons, enforced by a virtuous example.

The original intention of the Arabian traveller was to open to his son the route to the East. With this view the early studies of the youth were arranged; he was taught English, a language almost indispensable to the navigator, and Arabic, which he might one day have to speak in the native country of Mahommed; whilst geography and the mathematics were destined to form the basis of his education. But genius is a bough which it is vain to bend in a direction not given to it by nature. Niebuhr the father had traversed space, Niebuhr the son longed to overleap time; he saw his object distinctly marked beyond past ages, and, free from all trammels, it was towards antiquity that his meditations constantly aspired. He has himself told us, with a laudable frankness, that his father often lost patience with him on account of his desultory pursuits; yet it was during this time that he employed all his leisure in studying Sophocles. When his father chanced to give him a lesson in geography, or to pronounce the name of D'Anville, for which he entertained the most profound veneration, young Niebuhr saw before him nothing but the Gaul of Cæsar; he read again and again the commentaries of that great captain, and only derived from the learned French geographer archeological notions calculated to illustrate the progress of the Roman conqueror, or to restore some ancient city of Gaul.

Nevertheless, these exercises were merely preparatory. The celebrated philologist Jäger, editor of the Latin panegyrist, was the first master of Niebuhr; and it was under this renowned scholar that he became initiated into the mechanism of languages. His father, indeed, regarded languages only as the means of attaining science; he never stopped to examine the details; provided he understood the import, he was satisfied. The lessons of Jäger took deep root in the analytical mind of his pupil, who already began to display that vigorous stamp of genius which promises to make more discoveries in the obscure recesses of a library than the most robust traveller can hope to achieve on distant coasts, or on islands regarded as inaccessible to the navigator. Already had the idea of exposing him to the dangers of such an adventurous career been abandoned. The mother, whose solicitude was pushed to an imprudent excess, had at first created obstacles to the accomplishment of the views of Carsten Niebuhr respecting his son. In fact, the too assiduous cares which she lavished upon him so weakened his constitution that his health always continued precarious, and the irritability of his nerves sometimes re-acted upon his character, which, without ever ceasing to be noble and generous, was not always exempt from whim and caprice.

But whatever may have been the motives or considerations which changed the resolution of the father, young Niebuhr was sent to Hamburg, where he studied the science of commerce, as well in the prelections given on this subject by Professor Büsch, as in the most respectable mercantile houses of that rich city. But the illustrious Vossius was the friend of his father, and Klopstock likewise resided in Hamburg. How then could he resist the impulse of his genius, or escape being inspired with new ardour in favour of antiquity? When Vossius spoke of the Greeks and Romans, it might have been supposed that he had just quitted their society. Niebuhr was certainly no poet; but his genius felt itself warmed by the conversation of these great men. To Vossius he was indebted for those views, so distinct and precise, which he afterwards developed respecting the people of antiquity; whilst Klopstock taught him to interpret the language of tradition, when it speaks in its own natural voice, and describes, with equal grandeur and simplicity, the Ruminal fig-tree, the augury of the birds of destiny, the birth of Servius, or the truly Homeric battle of the Lake Regillus. "On dirait," says M. de Golbéry, "que dans ces pages admirables son style, tantôt naïf et tantôt majestueux, veut ranimer l'esprit du lecteur, et la dédommager de la sécheresse inséparable de la dissertation, comme les accens d'une musique religieuse délassent, par intervalles, une âme fatiguée de trop longues méditations."

But, not to anticipate, Niebuhr, having entered the university of Kiel, applied himself zealously to the study of jurisprudence, and was distinguished by the philosopher Jacobi, whom he ever afterwards esteemed, and also by Hentzler the physician, whose grand-daughter he subsequently married. From Kiel the young student proceeded to Edinburgh. The object of his father in prescribing this voyage was to combine with his other studies that of the natural sciences. Nor were his views in this particular disappointed. Niebuhr distinguished himself especially in chemistry, and became so enamoured of his experiments that little was wanting to direct his attention definitively to that subject, and fix his views on discovering some new substances rather than on re-awakening old and forgotten notions. Throughout the whole of his after life he delighted to recall his residence in Edinburgh. An old ship-captain of the Jacobite family of the Scotts had thirty years before received on board his vessel Niebuhr the traveller, and still prided himself on the circumstance. The honest seaman received the son of his old friend with affectionate cordiality, and the young German student lived in the greatest intimacy with the members of his family, "à laquelle," says M. de Golbéry, "appartient le célèbre romancier."

The studies of Niebuhr were now completed. A residence of eighteen months in Scotland had enabled him to study the institutions of that country; but as he wished to become still more intimately acquainted with the nation which his father estimated so highly, he devoted six months to travelling through different parts of Great Britain. During this period he took the greatest pains to inform himself respecting the manners, the usages, and the customs of the people, and in particular directed his atten-

¹ Secretary of justice or registrar would be an incomplete translation of this word. The *Landschrieber* also exercised administrative and financial functions. That the place of Niebuhr the father was superior to that of a simple registrar, is evinced by the circumstance that he joined to it the title of counsellor of state.

² "Au bord de l'Océan Septentrional," says M. de Golbéry, "non loin de l'embouchure de l'Elbe, est une contrée qui, sous le nom de Hadeln, a fait partie de la ligue Frisonne, et qui renferme la paroisse de Ludingworth, composée de cultivateurs libres. Le duché de Saxe-Lauenbourg, le Hanovre, la France, ont successivement étendu leurs limites jusqu'à ces rivages, mais peu de personnes connaissent ce petit pays. Désormais il sera célèbre, car il a donné à la science un nom deux fois illustré. Niebuhr le père a su conquérir pour la géographie l'Arabie, l'Inde, la Mer Rouge, régions dont les longitudes n'étaient pas déterminées, dont les cartes étaient imparfaites; Niebuhr le fils a fait reluire des clartés de son génie les antiques débris des institutions de Rome, et d'un regard assuré il a reconnu, malgré l'obscurité des siècles, la source du grand peuple, et les affluens qui lui ont apporté le tribut de leurs générations." (*Notice Historique sur la Vie et les Ouvrages de B. G. NIEBUHR, conseiller d'état, membre de l'Académie des Sciences de Berlin.*)

Niebuhr. tion to the system of British legislation; nor do we know any instance of a foreigner who, in the same space of time, acquired so extensive a knowledge of the public law and policy of this country. Niebuhr, in fact, loved that inertia, amounting even to obstinacy, which resists amelioration, and which sacrifices progressive improvement to the desire of repose. This sentiment was with him pushed to excess, and hence he felt distrustful of every ministry which appeared to favour reform. In a word, he had imbibed the essential spirit of Toryism, the distinctive characteristic of which is resistance to change. Dazzled by the greatness which this country had attained, he hastily concluded that all was directly owing to its peculiar institutions; and thinking that these were as perfect as human wisdom could render them, he conceived that nothing remained but to place them beyond the reach of innovation.

Niebuhr commenced his administrative career at Copenhagen, where he was at first appointed secretary to Schimmelmann, the minister of finance; and about the same time we also find him acting as secretary to a commission instructed to arrange some affairs with the Barbary powers. At the period of the bombardment of the Danish capital by the English, the precautions taken by Niebuhr contributed materially to save from the common disaster the library of which he had for some time been assistant-keeper. The knowledge which he had acquired in matters of finance soon became of practical utility to its possessor, and he was appointed one of the directors of the Danish bank. Distinguished alike for his ability and his desire to do good, Niebuhr did not confine his labours to the cabinet, but published several memoirs on the public administration, and on political economy. In the year 1804 he married the daughter of the *landvoght* of the district of Heydt. This union proved happy, and opened to him the prospect of enjoying in the bosom of his family the repose necessary for enabling him to discharge with credit his administrative labours. A career at once honourable and affluent seemed calculated to satisfy his ambition, whilst it afforded him leisure for the study of letters; it appeared, indeed, that Germany must for ever abandon to Denmark both Niebuhr the traveller and Niebuhr the future historian of Rome; and to the brilliant position which the latter owed to his father's celebrity and his own merit, it might have been supposed that he would content himself with adding the honourable reputation which, in official situations, always follows talent and probity. But fortune had ordered it otherwise.

The French were now waiting upon the shores of the Channel until winds less contrary should fill their sails, and waft them across to the white cliffs of Albion; their ensigns, it was hoped, were destined to wave over another Hastings, and, by a new conquest, to efface the remembrance of the warlike Normans. But England, alarmed at the prospect of a struggle for existence on her own soil, called Austria to her aid. France, however, was not taken unprepared. The legions arrayed for the invasion of England rushed like a torrent into the heart of Germany; in three months the Austrian monarchy was humbled in the dust; and the Russians, then so much dreaded, were driven into the lakes of Moravia. If less prejudiced, Niebuhr would perhaps have admired the prodigies performed by the modern Romans; and these few months, which concentrated more glory than might have sufficed to illustrate an age, would have appeared to him a fragment of the annals of a great people. But early impressions are almost never effaced. From his infancy, he had, in the paternal mansion, imbibed the most bitter prejudices against

France. On the one hand, he had been accustomed to hear only of the degenerate men or the effeminate courtiers of the old monarchy; and on the other, he had been horrified with pictures of the revolutionists, their scaffolds, and their crimes. In vain did the French army throw its victorious sword into the balance. The father of Niebuhr remained unmoved by its achievements, or rather became more exasperated in consequence of its successes; for if Denmark was the country of his adoption, he was a Hanoverian by birth, and each battle gained by the French afflicted the ancient subject of England, and wounded the sentiment of German independence. Even the expedition to Egypt, with all its romantic incidents and exploits, found no favour in the eyes of the old traveller. That the French neither could nor would do good, was with him a settled maxim.¹

It is not to be wondered, then, if his son remained insensible to the astonishing achievements of Napoleon. His soul, it is true, was formed to be moved with all noble and generous sentiments, to admire all courageous and heroic actions; but in the warriors of France he saw only the slaves of a military despot, and the instruments employed by him to overwhelm Germany. The fidelity of Denmark to France was, according to him, nothing but a base and cowardly complacence. That state, he conceived, was sacrificing its interests to its predilections; and when Prussia imagined that she had merely evoked the shade of the Great Frederick, in order to find nothing but *Soubises* in the armies of France, Niebuhr associated himself with this fatal delusion, and was one of the first writers to raise the cry of war. However, as the servant of a friendly power, he did not venture upon a direct attack. He borrowed the thunder of Demosthenes, translated the first Philippic, added to it notes filled with allusions to actual circumstances, and, lastly, dedicated the work, the first fruit of his classical acquisitions, to the Emperor Alexander. But he forgot that Napoleon was not Philip king of Macedonia, nor his warriors the barbarous oppressors of Athens; and he also neglected to observe that civilization was not likely to come to us from the north in virtue of an imperial ukaz. Prussia, however, understood this language; she called Niebuhr to her service, and he was named director of the commerce of the Baltic. But he did not long enjoy his new dignity. Scarcely had he arrived at Berlin, when the storm which burst at Iena and Auerstadt reduced the Prussian monarchy to dust; it became necessary to fly, and abandon to the homage of the conqueror the remains of the great Frederick. From Königsberg to Memel, from Memel to Riga, the court skulked from asylum to asylum. The French cannon pursued it everywhere, and amidst the snows and mud of Eylau, as well as on the plains of Friedland, the imperial eagles rushed to victory.

Nevertheless, Prince Hardenberg invited Niebuhr to assist in all the councils which were held during this crisis. The rectitude and constancy of his character never yielded or flinched; the same love of country, the same aversion for foreign domination, always distinguished him. During his stay at Riga, he employed what leisure business allowed him in studying the literature of Russia; but it appeared to him poor and barren, nor do we find that his occupations in this way had much influence upon his future labours. It may be supposed, however, that these pursuits inspired him with a predilection for the Russians, and an aversion for Poland, which it is difficult to reconcile with the generosity of his character. After the conferences of Tilsitt, he returned to Berlin; and recent

¹ It would be unjust not to add, however, that Carsten Niebuhr afterwards saw reason to modify his prejudices, in as far at least as concerns the sciences.

Niebuhr. events having made him advantageously known, he was employed on a mission of high importance, namely, to negotiate with the agents of Great Britain in Holland some affairs of finance. The latter country was then governed by King Louis, or rather it was administrated in spite of him, and in the interest of his brother. If this prince had been master of his states, tradition would preserve, for generations to come, the memory of one good king more. He understood perfectly all that was necessary to insure the prosperity of his new subjects; he was enlightened, loyal, and generous. Of this it was not long ere Niebuhr obtained a satisfactory proof. The police of the empire had covered the kingdom of Holland with its agents, and he had become an object of their attention. The king hastened to apprise him of the dangers to which he was exposed, and even to assist him in effecting his escape. The day came when this good king found himself proscribed and persecuted, even in the capital of the Christian world; all the thrones raised by his brother had been overthrown; but the noble use which he had made of his power lived in the recollection of the ambassador of Prussia, for that ambassador was Niebuhr; and Louis was respected at Rome for having been beneficent at the Hague.

When Niebuhr returned to his own country, the hour of her deliverance had not yet come. Prussia was then endeavouring to console herself for her misfortunes by a wise and liberal administration, and the ministry of Berlin was occupied in founding useful establishments. Niebuhr, who had just been named counsellor of state, had profoundly studied the agrarian law of the Romans; and Prussia at this period followed a system of improvement and colonization of waste lands, on which he furnished to the government some very remarkable memoirs. Roman history was thus in some measure applied to the soil, whilst the utility of the exact sciences, the progress of which exercises an influence on agriculture and the arts, was at the same time exemplified. In every point Niebuhr powerfully seconded the able and generous views of M. de Stein.

About the same period, Berlin was distinguished for a scientific activity almost without example. The university was created, and the Academy of Sciences re-organized. The recent labours of Niebuhr had secured him a place amongst the most eminent men of the kingdom; he belonged to the university, and was likewise a member of the academy. Buttmann, Heindorf, Spalding, and Savigny, arrived in succession. With these celebrated men he lived in terms of the greatest intimacy. In him also they recognised their equal, and, penetrating the depth of his views, notwithstanding the distrust which he felt of his own powers, they conducted him to that chair of Roman history, which he hesitated to occupy; "comme s'il présentait qu'après en avoir franchi les degrés, il ne lui serait plus donné de s'arrêter; comme s'il était effrayé de la rapidité avec laquelle ils l'élèveraient jusqu'à l'immortalité."

The eulogium contained in these words of Golbéry may be thought exaggerated; but in reality it is not so. Those who see nothing in history but a sequence of annals, and of facts crowded on facts, are pre-occupied with the thought that contemporary authors have bequeathed to us all antiquity, and cannot conceive that the moderns should employ themselves otherwise than in compiling and arranging ancient texts. It appears to such persons that to restore the beautiful edifice raised by Titus Livius, we must take fragments from Dionysius of Halicarnassus, Sallust, and Polybius; or glean here and there, in the grammarians and rhetoricians, some scattered indications which the current of ages would have swept into oblivion, if they had not scattered their erudition athwart its course. To act in this way is no doubt useful. By doing so one may ac-

quire the reputation of Trenchomius, make supplements to Titus Livius, and repair the mutilated monument of his history in much the same fashion as if a pillar of brick were substituted instead of a column of the Parthenon. Modern writers have only one advantage over these Latin compilers; that of preserving an uniform style in their compositions, and never betraying in their sickly restorations the imposing vicinage of the ancients. Whether they confine themselves to translation, or attempt to complete what has been left unfinished, the edifice is all trowelled with the same mortar; and if it has neither majesty nor solidity, its distribution at least may present an appearance of regularity. But if, in an access of hallucination, it should enter into the mind of a modern to abandon this coarse plastering in order to create in his turn; in short, to construct a rival monument to that of Titus Livius; his folly would be the same as that which the viceroy of Egypt might be charged withal, if he should take a fancy to raise new pyramids beside those of Djizeh, or to surpass the wonderful masses which traditionally own Cheops or Cephrenes as their architects.

But such was not the conception of Niebuhr. His views on Roman history, at the moment when he undertook to teach it, were very different. If, said he, the masterpiece of Titus Livius were still entire, and presented to us a continuous history, it would be at once extravagant and presumptuous to attempt to imitate it in order to attain its perfection. Such an undertaking would be absurd, even although we could collect materials more abundant than those which he had consulted, or record traditions different from his. If Titus Livius still existed entire, the task of the moderns would, in the view of Niebuhr, be limited to disentangling poetical history from the primary facts preserved by tradition, and applying a critical and inquiring spirit to proud family legends, renowned consulates, imaginary triumphs, and those fallacious notions which have passed from panegyrics and funeral orations into histories. But of that admirable work we now possess only disjointed fragments; and if other indications enable us sometimes to divine its course, it is nevertheless with it as with those ancient aqueducts of which we discover the general direction only because some of their ruined arches appear at various distances in the valley or the plain.

The historian of Rome must have a different object in view; an object which it would be his duty to attain, even if classical literature had still presented itself to our consideration as it did to that of the contemporaries of Augustus. It would be incumbent on him to apply his mind to the critical examination of facts, and to researches connected with institutions of which the indifference or ignorance of authors has suffered the memory to perish. Sallust conceived himself obliged to inform the Romans that their own country might, not less than Greece itself, glory in great actions. All their views were, in fact, fixed on the latter; they disdained their own language; they despised the annals of their country. In vain had the elder Cato written his *Origines*; in vain had some other Romans attempted to create a national history. They had no readers; and perhaps Titus Livius was the first who succeeded in avenging that long oblivion of so many great actions and noble characters. Like a majestic hymn, his narration at once filled the ear and awakened the patriotic feelings of the Roman. He struck a chord to which the hearts of his countrymen responded; and henceforward they despised the subtleties of the Greeks, who, excepting Polybius, occupied themselves with debating questions of fatality on the grandeur of Rome, and who consoled the vanity of their countrymen by announcing, in periods elaborately rounded, that destiny had made Rome the mistress of the world, and consequently that no disgrace attached to their inevitable defeat.

Niebuhr.

But what really were the ancient institutions of Rome? Was it to these that she owed her success? Could her virtues and the devotion of her citizens fail to triumph over all obstacles? These are questions which never engaged the attention of the Greeks. Neglected by the Romans themselves, the original organization of the state had become a subject of doubt even in the time of Cicero. In regard to all that was known of old Rome, and what still remained of ancient institutions, every contemporary might form a judgment, but few persons paid any attention to the subject; and nothing respecting it was consigned to histories written for a posterity which it was not imagined could ever cease to be itself Roman. None of the authors whose works we possess, either in whole or in part, appears to have thought that it would one day be necessary to learn what every one knew in his time; and that from the division of the people into centuries until the occupation of the day of the citizen, every thing would be an object of research. Titus Livius, moreover, has given himself little or no concern about this species of exposition; anxious only to render his narrative attractive, he has rarely shown himself an archeologist, seldom formed a distinct idea either of the different peoples or states, and never consulted the old inscriptions of the Italic nations, or examined the archives of Rome. Hence it is necessary, by means of research and meditation, to penetrate the sense of detached notices comparatively few in number, and, by combining them together, to retrace the image of what the eternal city was at its birth; to recognise in its primitive population the different elements of the Italic races, and in its institutions the result of this fusion; to follow the progress of both, and, wherever the soil is covered with ruins, to seek under the rubbish for the ancient foundations by which it is still furrowed.

It was on the 26th of October 1810, that, in a masterly and vigorous introduction, Niebuhr unfolded these brilliant and profound views. Their splendour might no doubt prove too much for eyes accustomed only to view Rome through the magnifying glass employed in libraries to decipher ancient manuscripts. The school of routine, in fact, cried out scandal; but elevated minds were more enlightened than dazzled. Niebuhr was listened to; his lectures were numerous attended; and their increasing success gave birth to the first volumes, published in 1811 and 1812, which he afterwards completely recast. The apparition of these volumes was for the time a meteor the reflection of which illuminated all the literature of Germany. They gave rise to profound controversies, to ingenious systems, and to learned philological discussions. Niebuhr himself, without conceding any thing to the criticisms of others, became a severe judge of his own work. He afterwards lamented that at first he possessed only the erudition of a man who had instructed himself; and he had the modesty to compare his own proceedings to the uncertain motions of the sleep-walker, who wanders at hazard on the edge of the roof. But with more justice it may perhaps be said, that in these first essays the lights of his genius were like those brilliant coruscations with which a fiery atmosphere irradiates summer nights without a cloud, and which, so far from keeping to any determinate place, incessantly show themselves at all points of the horizon.

This period of creation and enthusiasm was also marked by other productions. Thus, in the same year in which he naturalized himself in the Rome of Servius Tullius, he na-

vigated with Scylax, interrogated the text of his *Periplus*, and read to the Academy of Sciences a dissertation having for its object to determine the epoch when that work was composed, which, according to him, was the first half of the reign of Philip, or about the 105th Olympiad. A competent judge, M. Letronne, has declared that this dissertation was the best which had yet appeared upon the expedition of Scylax.¹ At this time also he delivered a deliberate opinion concerning the epoch to which the second part of the inscription of Adulis belongs;² occupied himself with the geography of Herodotus; determined the state of science in the time of the venerable father of history; threw some light upon the annals of the Scythians, Goths, and Sarmatians; and, lastly, by an ingenious and sound criticism, effaced from the collected works of Aristotle the second book of the Economics, which had beyond all doubt been composed in Asia Minor subsequently to the time of Theophrastus.

Nevertheless, the face of the world was about to change. The finest army which had ever been assembled for the purpose of conquest had just perished amidst the snows of Russia. We have already stated what were Niebuhr's sentiments in regard to France. At this critical moment he united with Arndt, and along with him published a journal entitled the *Prussian Correspondent*. This journal was promptly informed of all events. From Spain to Poland, and from Italy to England, it collected every thing calculated to rouse German valour; it announced or presaged success, published vehement manifestos, inflamed the minds of the youth, revived old resentments, and, in short, prepared a war of extermination. The cabinet of Berlin was not slow in obeying the impulsion thus given. Soon afterwards, Niebuhr, having joined the armies of the allies, assisted at the battle of Bautzen; and at that of Dennewitz he himself laboured with Schleiermacher in raising redoubts on the Creutzberg. But not long afterwards, the king of Prussia, whom he had accompanied into the field, sent him into Holland. This was about the time when the formation of the kingdom of the Netherlands began to be discussed in the diplomatic meetings. Niebuhr hesitated not to express decided disapprobation of the proposed fusion of the two states of Holland and Belgium. He spoke often against this project to the mother of the king, who had admitted him into her intimacy, because she had learned to esteem him; and, not content with this frank manifestation of his sentiments, he placed himself in direct official opposition to the calculations of the statesmen of the moment, founded as these were upon confined views and superficial estimates of national character. But on this occasion mediocrity believed itself superior to genius, and, sixteen years afterwards, Belgium reproduced its protestation written in characters of blood.

In the year 1815, Niebuhr was overwhelmed with severe domestic affliction. He lost his father on the 26th of April, and consequently took no part whatever in the events which followed the return of Napoleon from Elba. Absorbed in grief, he sought consolation in writing the life of the Arabian traveller. This biography is short, and free from declamation; and the style is simple, natural, nay often sublime. No extravagance, no useless details, none of those digressions with which the smallest commentator conceives himself bound to overload the author whom he has made the object of his care, deform this composition. It is even remarkable for its strict impartiality. Carsten

¹ If this assertion be no longer correct, M. Letronne has himself only to blame; for he has published a treatise on the ancient geographers, which is in all respects a masterpiece of erudition. Niebuhr entertained a high esteem for this great scholar, and used to observe, that he alone was worth a whole academy.

² See also the Researches of M. de Sacy, and the advantage which M. Champollion-Figeac has derived from these in his *Annals of the Lagidæ*; a work crowned by the Institute in 1819, and which, notwithstanding the controversies to which it has given rise on some points of chronology, is continually cited as an authority amongst our neighbours the French.

Niebuhr. Niebuhr, the son of a cultivator, died counsellor of state, knight of the order of Danebrog, and member of the principal learned societies of Europe; he had never accepted any other title of nobility, which, in his estimation, would have only served to impeach the humility of his virtuous progenitors. His son, the historian of Rome, was likewise counsellor of state, member of the Academy of Sciences, ambassador, and he had no wish, any more than his father, to be ennobled. Both judged rightly. The one had illustrated his name as far as the Indian Ocean; the other had carried it back to the age of Rhea Silvia. The authority of parchments does not go so far in space, nor ascend so high in time. A few weeks after the death of his father, Niebuhr had to lament the loss of his wife. To her, however, the historian consecrated no biography. The gentle virtues of the female sex, concentrated around the domestic hearth, seek no illustration, and their remembrance rarely survives even in those families the happiness of which they had most essentially contributed to promote.

The new tempest which had in the interval exhausted itself, awakened all sorts of ambition, and the conquerors were disputing with avidity the division of the spoil, or, in other words, that of continental Europe. Niebuhr took a part, somewhat too active perhaps, in favour of the ambitious pretensions of Prussia, and wrote, in a vehement style, a pamphlet, entitled *Prussens Rechte gegen den Sächsischen Hof*, or Rights of Prussia against the Court of Saxony. But he at the same time showed himself the courageous adversary of M. de Schmaltz, and the steadfast supporter of all the patriots. So much nobleness of character was not calculated to endure long the atmosphere of courts. The virtue and the frankness of Niebuhr annoyed the ministry; and although his services had entitled him to aspire to the highest dignities of the state, it was now resolved to remove him. His mission to the Holy See may therefore be considered as only an honourable exile. But to Niebuhr the employment which removed him from Berlin to Rome was any thing rather than a subject of regret. He felt himself as it were drawn towards that intellectual fatherland which had given him erudition. In the city of the pontiffs he discerned from afar the vestiges of the *enceinte* of Servius Tullius, and occupied himself with the forum and the tribune or pulpit whence harangues had been delivered to the people, much more than with the chair of St Peter, with which he had to negotiate the interests of the Catholic subjects of Prussia. By this time his scientific activity had resumed all its vigour, and, notwithstanding the distractions inseparable from the new union which he wished to contract with the grand-daughter of Dr Hentzler, he began his relations with the celebrated Angelo Maio by publishing the fragments of Fronto, which that learned Italian had just discovered. Associated with him in this undertaking were Buttman and Heindorf, men of a kindred stamp, and, along with the historian of Rome, forming a triumvirate of which the learned in Europe will not soon lose the remembrance. About this period, also, Niebuhr read to the Academy of Sciences a dissertation on some scenes audaciously interpolated into the text of Plautus by the insipid versifiers of the middle ages.

The science of law was then in course of being enriched with the fine conceptions of M. de Savigny. Niebuhr felt inspired by his conversation; he venerated the jurisconsult, and cherished the friend. M. de Savigny engaged him to visit several libraries of Italy, conceiving that they still contained, or rather concealed, valuable remains of the ancient jurisprudence. Niebuhr stopped only a few days at Munich, where he again saw Jacobi, one of the men whom

he esteemed the most; then crossing the Brenner, the limit which he had assigned to the ancestors of the Etruscans, he traversed the Tyrol, and having arrived at Verona, almost immediately discovered the Institutions of Gajus, the prototype of those of Justinian. They were found on a palimpsest or rescribed manuscript, which had for ages remained unnoticed in the library of the chapter.

During a residence of seven years in the ancient capital of the world, Niebuhr enjoyed almost uninterrupted happiness. He cherished his young children, and her who gave them birth. His house was open to his countrymen; it was the resort of artists and learned men of all descriptions. The hour propitious to discovery had arrived; Niebuhr, attempting to glean where the celebrated Maio had reaped, published the *Fragmenta Ciceronis*; and if the most entire concord did not always subsist between these learned men, it is nevertheless agreeable to find them united by the most brilliant discovery of our time. When the learned Italian had recovered the Republic of Cicero from beneath some commentaries of St Augustin,¹ Niebuhr furnished notes to the first edition, discussed and restored some of the passages which had been most altered or vitiated, and by his ingenious conjectures contributed to advance the science of philology.

Niebuhr, having greatly modified his ideas in regard to France, now observed with much interest the progress of constitutional opinions. Nevertheless, being attached to all governments consecrated by time, he was desirous that the old dynasties should strike their roots deep into the soil of constitutional Europe. In his opinion, too much blood had already been mingled with that soil to run the hazard of shedding more. He had accordingly an equal aversion to revolutions on the one hand, and to the excess of power on the other; and hence the distinguished orator who declared from the French tribune that it was necessary "to plant the royal standard in the midst of the nation," expressed the opinion of Niebuhr with all the eloquence and majesty of an ancient. The vehement and warm improvisations of M. de Serre; his noble and generous views, so often developed in the most brilliant harangues; obtained for him the esteem of the ambassador of Prussia. The latter saw in him a Roman of the best days; and when, like himself, repulsed by courtiers incapable of entertaining elevated conceptions, M. de Serre was sent to Naples, the French envoy appeared rather to arrive from another time than from another place. These men were soon connected by the ties of the closest friendship; and when a premature death had taken from France one of her noblest sons, Niebuhr formed the design of writing the history of his life, and never afterwards spoke of him without the deepest emotion.

It was in the year 1823 that Niebuhr took his departure from Rome, after having passed there seven years, the whole of which period had been devoted to the cultivation of the sciences. During this long residence, a great number of important dissertations increased the claims which Niebuhr had already acquired to the admiration of learned Europe. In 1819, we find him discussing the merit of the Chronicle of Eusebius, and endeavouring to ascertain what advantage chronology might derive from the discovery which had just been made in the Armenian convent at Venice. Not long afterwards, he determined the epoch in which Quintus Curtius lived, and that in which Petronius wrote. In elegant and easy Latin, he also explained the restitutions of which the inscriptions brought from Nubia by M. Gau appeared to him to be susceptible, and read this beautiful production to the Academy of Archeology. A Ger-

¹ The writing superimposed appeared to belong to the tenth century, and contained the commentaries of St Augustin on the Psalms, from the 119th to the 140th inclusive.

Niebuhr. man bookseller intending to have the topography of *Lalande* reprinted, Niebuhr strenuously opposed the design, and wrote on the subject a learned and luminous *monography*, which appeared in the *Kunstblatt* of Tübingen, and is also inserted in the collection of his works. Lastly, it was by his counsel and encouragement that Platner and Bunsen undertook the important work, which is still, we believe, in course of publication, and which will in all probability be the more perfect that M. Bunsen succeeded Niebuhr in the embassy, and consequently was placed in a situation to continue the researches of his illustrious predecessor on the topography of Rome. The demission of Niebuhr appears to have been principally occasioned by the injurious influence of the climate of Rome on the health of his wife. But it is also possible that a little jarring or asperity in his diplomatic relations may have deprived him of the favour of the court. He feared not to plead the cause of humanity, and though he had not been called to the congress of Verona, he remonstrated in favour of the Greeks, whom a policy equally ridiculous and barbarous had abandoned to the legitimacy of the Turkish sabres.

Before quitting Italy, Niebuhr proceeded to visit Naples, Pompeii, and M. de Serre; he collated a manuscript of the grammarian Charisius, and then set out for Germany, without any determinate project as to his future establishment. Nevertheless, he resolved not to pass by Saint-Gall, where discoveries so important had been made in the fifteenth century. In this ancient monastery he remained for some time, but only obtained by his researches a few obscure fragments of the poem of Merobaudes, which he published the same year, 1823. From Saint-Gall Niebuhr made a sort of pilgrimage to Heidelberg. The celebrated Vossius then resided in that city, and the ambassador of Prussia, the academician, and the historian of Rome, went to carry to this old friend of his father the grateful homage of the young student of Hamburg. After this act of piety almost filial, he directed his course towards the provinces of the Rhine, there to await the orders of the king, and also because he entertained an anxious wish to visit Paris, and make the acquaintance of those learned men whose communications had served to gladden the last years of his father's life. He was also desirous to converse with M. Letronne, whose positive erudition corresponded to the conscientious exactness of his own, and each of whose dissertations presented all the characters of mathematical demonstration. France then inspired him with the most lively admiration. She was rich in all kinds of scientific glory; but the reading of hieroglyphics (which, however, does not belong to France as a discovery, but to England and Dr Young) was, in the estimation of Niebuhr, the most splendid achievement of the erudition of our time.

Detained at Bonn by fortuitous circumstances, he immediately set about continuing his Roman History, the preparation of which had suffered considerable interruption. His residence at Rome did not admit of that assiduous labour, or that accurate examination of books, required by the publication of a history; he was only occupied in receiving impressions, and in studying monuments. On the other hand, he still hoped one day to rekindle those inspirations with which his mind had been originally filled and delighted by the conversation of Savigny. The third volume of the History of Rome was prepared during the winter of 1824, and Niebuhr was about to publish it, when he was recalled to Berlin, where he took part in the deliberations of the council of state, and where, also, he was honoured with the favour of the prince-royal. He had

perceived, however, that the publication of his third volume would require that the two preceding ones should be completely recast. This he accordingly undertook in 1825; and the gratuitous courses of lectures which he delivered facilitated his task. Pyrrhus said to his Epirotes, "You are my wings." The zealous professor was animated with the same feeling towards pupils whom he loved, and who listened with their whole souls to his discourses. What distinguished his prelections was not precisely eloquence, to which he made no pretensions. It was a sort of inspiration; it was the richness and abundance of matter; it was, in fine, the air and tone of earnest conviction, a quality which never fails to make a deep impression, though it may sometimes be pushed too far. Whenever he had apprehended and made himself master of a subject, his opinion became to him like an article of faith; his persuasion was complete.¹ It may easily be supposed, therefore, that the attacks directed against his fundamental ideas made very little impression on him. During the twelve years which had elapsed since his work first appeared, it had given occasion to a great deal of discussion. M. de Schlegel, in particular, had, in his *Annals of Heidelberg*, claimed for Greece the honour of having given birth to the "*peuple-roi*;" but the article in which Niebuhr examined those national songs and traditions which surround the cradle of Rome with a flickering and uncertain atmosphere appeared to him a work of extraordinary merit. Three years afterwards, Professor Wachsmuth, a man of positive and severe erudition, wrote a history of the Roman State, in which he constantly advances alongside of his adversary, attacks him without intermission, re-establishes what he had overturned, and pulls down what he had built up. In none of the editions of his first volumes which he afterwards published, did Niebuhr make any mention of these formidable antagonists. On the contrary, he affected silence in regard to them, notwithstanding he had engaged in a warm controversy with Steinacker, Francius, and Blum, on the celebrated passage in the republic of Cicero, containing details respecting the comitia. Some years before his death, Golbéry asked him, if, in his second edition, he would not reply to Schlegel and Wachsmuth. At this question his countenance became clouded with an expression of dissatisfaction, and he answered drily that he would name no one.

The man who believes in the knowledge he possesses as the Moslem in the Koran, cannot fail to be exclusive. Unfortunately this was the great defect of Niebuhr. He kept too much aloof from other men of learning, nay, even from those whose labours do honour to their country, whenever the shock of opinions, or a different system, interposed to wound his orthodoxy. It would be endless to enumerate all his antipathies, or to name the distinguished professors with whom he was at feud. It is more satisfactory to state, that his aversions were not of long duration, and that, if prone to take offence, he was equally ready to forgive. In his correspondence with Golbéry, which, on one occasion, had assumed a tone of vivacity, if not a controversial character, Niebuhr observes, with equal justice and discrimination, "It often happens in literary discussions, that a moment of passion, or a transient irritability, leads us to give pain to a man who is otherwise the object of our esteem. Of this there have been numerous instances, from the stormy contentions of the Forum to those of the Chamber of Deputies, and, in philology, from the time of Laurentius Valla to that of Hermann. I experience the regret which accompanies these unfortunate displays of vivacity; I feel satisfaction in seeing the remem-

¹ To one of the most esteemed of the French savans, who, on a particular occasion, stated various objections to his secular cycle, Niebuhr replied, that it was with him a matter of conscience.

Niebuhr. brance of them completely effaced; and my gratitude to him who seeks to re-establish what appeared to me destroyed, enhances the feeling of respect with which his good qualities had otherwise inspired me." Few men possess the candour and the magnanimity thus to acknowledge their failings. On more than one occasion Niebuhr essentially obliged those persons of whom he conceived that he had most reason to complain. With regard to that class of critics who have no other authority than what they derive from their bookseller, Germany, more perhaps than any other country, is a prey to their impudent presumption. For this class of writers Niebuhr had such thorough contempt that he rarely looked into the periodical publications, and almost never read those analyses which are denominated reviews.

In publishing his second and third editions, Niebuhr was far from extending this just disdain to the estimable men who had contested some of his discoveries; he only pretended that what they had attacked in their criticisms was not the weak side of his work. Hence he did not think it enough to persist in the greater part of his results; he had new proofs to produce, and new solutions to give. At the same time, he freely abandoned a fundamental idea of his original essay. In his eyes Rome was no longer Etruscan, but formed by an union of the Etruscan element with the Sabines and the Latins. His residence in the ancient capital of the world had enabled him to illustrate some points which were formerly obscure; and since the commencement of his researches, three new and abundant sources of information had been opened by the publication of Lydus, of Gajus, and of the fragments of the Republic of Cicero; whereas, previously, ages had passed away without adding any thing to the means of extending our knowledge. But it is only by study that his book can be understood. The perusal of it is difficult, nay, even painful; nor can the meaning of the author be discovered or appreciated, except by those who have thoroughly mastered the ancient texts. The quaint archaism of the phraseology also serves as an additional obstacle to its intelligibility. To him may justly be applied what Cicero said of the first orators of Attica; in them we remark noble expressions, a great abundance of ideas, many things in few words, and withal a little obscurity.¹ The inspiration which is most familiar to the author often blends itself with this obscurity, and Niebuhr then appears to give out oracles. But if in the expression there be any want of finish or precision, or any thing which subjects the mind to a labour of divination, such deficiency is compensated by the elevation of the thought, and by a penetration hitherto without example. The defects of his style are still more sensibly felt in the French translation, because the language of our neighbours, always clear and precise, does not naturally admit of vague and uncertain forms of expression; and because, in requiring an author to make an entire disclosure of his thought, it had to undergo no small violence in order to accommodate the expression to the standard of the German original. This inconvenience it was almost impossible to avoid, without injury to the peculiar character of the work. Niebuhr, whose mind was in other respects so elevated, was not less the proprietor of his words than of his ideas, and without accepting the one we could not be enriched with the other. France, however, required a translation, and one almost interlineary was produced, resembling somewhat the versions of Homer which are put into the hands of scholars. The book, in short, was intended for science, not for literature; although this circumstance, which is distinctly stated in the preface, has been lost sight of by

some who have criticised it. The English translation is of a different character, and executed on an opposite system, with singular ability and success. It exhibits the History of Rome in a cognate idiom, admitting the transfusion of much of the peculiar spirit of the original; and it contains as full and complete a reproduction of its characteristic qualities and excellencies as it is perhaps possible for any translation to do. As to the original itself, it is undoubtedly a masterpiece; "a foundation for all ages," but, unhappily, "without a superstructure." If Montesquieu takes the flight of the eagle, Niebuhr has the eagle's eye. We may contest some of his opinions, or apply his method to science in order to make new conquests; but, to use the expression of a learned critic, "on passera sur sa trace, sans jamais l'effacer."²

Niebuhr made immense sacrifices for the prosperity of the university of Bonn. He gave public courses of lectures, although he did not occupy a chair in that seminary; and from his appointments as counsellor of state he founded prizes on different questions of history and philology, which he proposed for competition to the students. As soon as he perceived in the latter indications of merit, his purse was open to them; in him they found at once a patron, a director, and a friend. He only quitted his new residence twice; once to undertake a journey to Berlin, of which we have already spoken; and some years afterwards to conduct his wife into Holstein, and there to seek the repose rendered necessary by the excessive labour he had undergone. It has been remarked as a proof of his modesty, that, in passing through Göttingen, he inscribed his name on the register of the library, with the addition of Private Teacher at Bonn.

The last period of his life was not the least laborious, inasmuch as he then conceived and executed the project of reprinting the authors of the Byzantine Collection. The most celebrated philologists in Germany were associated in this enterprise, and the learned M. Hase was enabled to restore to erudition his *Leo Diaconus*, the first edition of which had been lost by shipwreck. Niebuhr himself commenced the collection by the publication of Agathias; he superintended the impression of many other authors; he enriched with prefaces a number of the volumes; and by his counsels he directed the labours of his young friends Schopen and Classen. Niebuhr had also established the Museum of the Rhine, a periodical publication, which he enriched with most learned dissertations. He there demonstrated that Lycophron was only contemporary with Philip the son of Demetrius; and that he had been erroneously confounded with the tragedian of Alexandria. Availing himself of a passage of Tzetzes and of a scholium, he discovered an important fact in Italic history. In another dissertation,³ he compared some fragments of Teles with an obscure passage of Athenæus, and determined the precise war which the latter calls Chremonidian. As to Chremonides, who gave it his name, Niebuhr makes him a general in the service of the king of Egypt, and refers the events in question to a period close upon the 127th Olympiad. Lastly, the Abatte Maio having discovered a fragment of Dion Cassius, Niebuhr, notwithstanding multiplied *lacunæ*, restored the text with singular success, and demonstrated its importance to Roman history, particularly in reference to the quarrels of the tribunes with the senate on the subject of the abolition of debts, the capture of the Janiculum, and the *Lex Hortensia*.

Amidst these multiplied occupations, the second volume of his Roman history was in its turn recast, and the manuscript had already been prepared for the press, when, on

¹ Brutus, *De Claris Oratoribus*.

² M. Lerminier, in *Le Globe*.

³ Both these dissertations were, in 1826, translated into French by M. de Golbéry.

Niebuhr. the 7th of February 1830, a night of disaster destroyed the fruit of so much labour. A violent conflagration consumed the upper floors of the house which Niebuhr had destined to be the asylum of his old age. This severe calamity obliged him to recommence his volume entirely, and he passed several months in this painful occupation. His faculties were even affected by the toil which it imposed: "I advance," said he, "by means of efforts which I may venture to call excessive; my memory is impaired to such a degree that I can no longer deceive myself as to the cause of this decay." We have already stated that Niebuhr was of a very feeble constitution. He was of small stature, with a quick and keen eye; his countenance was agreeable, and of a mild expression. The family affections constituted his whole happiness; and the most profound studies never prevented him from smiling on his infant children, or calling to his arms his little Marcus, whose interesting figure, happy disposition, and amiable character, struck every person who saw him beside his good father, a man as deserving of the domestic happiness he enjoyed, as of the great reputation he had acquired. "Twice during my residence at Bonn," says M. de Golbéry, "I went to see him; and of both visits I retain recollections that can never be effaced. The conversation of men such as Niebuhr is an advantage rarely enjoyed; the hours passed in listening to him have left in my mind an impression at once delightful and solemn; he appeared to me simple and good. During my first visit he related to me the history of his whole life; several of the facts and judgments contained in my notice of him I owe to that conversation; but, in my sketch, they are presented without that charm of expression, and that elevation of thought, which caused me to forget the flight of time; and the approach of night alone apprised me that one of the longest days of summer was drawing to a close."

Niebuhr had not yet recovered from the effects of the excessive labour to which the destruction of his house had condemned him, "when," to use the expression in the preface to his second volume, "the madness of the court of France broke the talisman which kept enchained the demon of revolutions." The news of the ordonnances of July had filled him with indignation; and in his public course he made a vehement address to his pupils, in which he spoke of the perversity of a ministry that sacrificed to despotic and sacerdotal notions the happiness of a nation and the imprescriptible freedom of thought.¹ The sagacity of Niebuhr did not, however, enable him to foresee the true results of that unparalleled act of audacity and folly. He was strangely surprised when, three days later, he received intelligence of the events which had occurred in Paris. Niebuhr regarded the rights of nations as sacred as those of kings, and, as a vindication of the former, he applauded the principle of the Revolution of July; a principle, we may add, which was speedily disregarded by the government which that great popular commotion installed on the ruins of the oldest dynasty in Europe.

So much agitation, disquietude, and labour, rendered it impossible for him to receive very strong impressions without danger; any thing, however slight, which affected his health, might become fatal. Niebuhr often went out to read the journals. On Christmas day he returned with a severe cold from a reading-room, where he had perused with deep attention the pleadings of M. Martignac and M. de Sauzet, which strongly affected him. A slight degree of fever accompanied this cold; but, from the 30th of De-

cember, his medical attendant recognized the symptoms of a mortal inflammation. The pain, however, diminished inversely as the danger increased. He preserved to the last moment his reason entire, saw the term of his existence approach without discomposure, and surrounded himself with the objects of his affections. At length, on the 2d of January, at two in the morning, this truly great man breathed his last, and "*l'âme du juste alla se confondre dans la divinité, dont elle était une faible mais pure émanation.*" Madame Niebuhr, weakened by protracted suffering from an affection of the chest, sunk under her sorrow in a few days afterwards; and four orphan children, confided to the care of M. de Classen, were subsequently sent to some relations by the father's side in Holstein.

Niebuhr left but few manuscripts. The third volume of his Roman History, which had escaped destruction when his house was burned, has since been printed; and there exist also some fragments of the fourth volume, but in small number. Much may be expected from M. de Savigny, who was thoroughly cognisant of all the great conceptions of his friend; and from M. de Classen, who, for a long period, had not quitted his house. In his last letter to M. de Golbéry, Niebuhr had offered him additions to the first volume of the Roman History; but it is uncertain whether these were found amongst his papers, or whether he had written the life of M. de Serre, which he had certainly the intention of publishing. There may also be found amongst his papers a project relative to Goethe; it was addressed to M. Schweighœuser, whom he had requested to obtain from the priest of Sessenheim a portrait of Goethe such as he was when his residence at Sessenheim rendered that place celebrated. When this was sent to him, little did either M. Schweighœuser or his friend M. de Golbéry foresee that Niebuhr, who was still in the vigour of his age, would reach the term of his career before the patriarch of German literature, whose likeness he was so anxious to procure. A short time before his death, the Prussian government had engaged him to return to Berlin; but he declared to M. de Golbéry that he preferred the quiet of his retreat, and pursuit of his peaceful labours, to the tumult of the capital and the cares of public business. (A.)

NIECE, a brother's or sister's daughter, which in the civil law is reckoned the third degree of consanguinity.

NIEMEN, a large river of Poland, which rises in Lithuania, where it passes by Bielicka, Grodno, and Kowno; it afterwards runs through part of Samogitia and Prussia, where it falls into the lake called the Kurisch-haff, by several mouths, of which the most northern is called the Russ. This lake communicates with the Baltic.

NIEPER, or DNEPER, a large river of Europe, and one of the most considerable of the north, formerly called the Borysthenes. Its source is in the middle of Muscovy, and it runs westward by Smolensko as far as Orsa; it then turns south, and passing by Mohilow, Bohaczo, Kiow, Czyrkassy, the fortress of Kudak, Dessau, and Oczakow, falls into the Black Sea.

NIESTER, or DNEISTER, a large river of Polish Russia, having its source in the lake Niester, in the palatinate of Lemburg, where it passes by Halicz. It then separates Podolia and Oczakow from Moldavia and Budziac Tartary, and falls into the Black Sea at Belgorod, between the mouths of the Dnieper and the Danube.

NIEUPORT, a fortified city of the Netherlands, in the province of West Flanders, and arrondissement of Furnes.

Niece
||
Nieuport.

¹ Niebuhr had conceived high expectations of the administration of M. de Martignac, who appeared to him the only man destined to realise the conception of M. de Serre, and to rally all Frenchmen round a dynasty which it was the duty of all good men loyally to support as long as it remained faithful to its oaths. He accused of bad faith, both those who opposed to this ministry old obstinacy and the prejudices of the court, and also those who prevailed on the chamber to refuse its support to the discussion of the departmental law. He had unbounded esteem for the fine talents and noble character of this statesman, and was more proud of the approbation which M. de Martignac had expressed of his Roman History, than of any other testimony in its favour.

Nievre
||
Niger.

The environs are unhealthy, from the low situation, which, by the facility of inundation, forms one of the chief means of defence. It is situated at the mouth of the Iser, by which it has water communication with Dunkirk, Bruges, and Ypres. It contains 2600 inhabitants, who are chiefly occupied in the herring and cod fisheries. Long. 2. 39. E. Lat. 51. 7. N.

NIEVRE, a department of France, formed out of the ancient duchy of Nivernois. It extends in north latitude from 46. 52. to 47. 36. and in east longitude from 2. 39. to 4. 6. It is bounded on the north by the departments of the Loiret and of the Yonne, on the east by the Côte d'Or and Saone-Loire, on the south by the Saone-Loire and the Allier, and on the west by the Cher. In extent it is 2528 square miles, or 681,093 hectares, and is divided into four arrondissements, twenty-five cantons, and 317 communes, the population of which amounts to 240,250 persons. It is generally a hilly district, and on the eastern side it is mountainous. Nearly one third of the surface is covered with forests; and as the cultivation is bad, it does not produce a sufficiency of corn for the supply of the people, what it does yield consisting mostly of oats, rye, and barley, with very little wheat. Some of the meadows on the banks of the rivers feed cows, which, with the produce of the forests, furnish the chief commodities with which the people are enabled to buy corn. There are some mines of iron, the working of which, and converting the raw material into common utensils, furnish the chief employment to the scanty population. Some wine is grown, but mostly of inferior quality, and not adequate to the consumption. By its rivers and canals the department is well supplied with cheap means of conveyance for its wood and its iron. The fisheries on the rivers and the lakes are productive, and in part supply fish to Paris. The department elects two deputies for the legislative body. The capital is the city of Nevers.

NIGER, or, more properly, QUORRA, a great river of Central Africa, the course and termination of which, for upwards of forty years, excited an interest beyond any other question connected with the geography of the globe, excepting perhaps that of the north-west passage. This arose not only from the importance which naturally be-

longs to the solution of any great geographical problem, but from the various and conflicting theories which had been formed relative to the Niger. The points which so long remained undecided were, whether the large interior river of Africa, first mentioned by Herodotus, and afterwards by Pliny, Ptolemy, Leo Africanus, and others, could be identified with that which we now call the Quorra or the Joliba, which latter is its name during the earlier part of its course; and whether this river lost itself in the great Lake Tshad, Tshadda, or Shary, or terminated in the Atlantic Ocean. These were the main questions which were agitated by geographers; but there were others which occupied no inconsiderable degree of attention, such as, whether it carried its waters under ground through the Great Desert, into the Gulf of Syrtis, or whether it flowed in an easterly direction, and formed a branch of the Nile. But every difficulty has at length been cleared away by the enterprise and perseverance of Britons, and we can now trace the entire line of this great river. To the first question, whether the Quorra be the Niger, meaning by that the river so named in the works of ancient geographers and historians, a negative answer has been very generally given; and with regard to the termination of the Quorra, it has been found to flow into the Atlantic through a number of mouths situated in a delta, at the head of the great gulf of the western coast of Africa. The discovery of the termination of the river which has been so long and so improperly called the Niger, was made by Mr Richard Lander, a very humble but intelligent individual, who, without having any prejudices to gratify, or theory to support, set about the task in a straightforward manner, and accomplished, not without difficulty and danger, an undertaking in which all former travellers had failed, from having fallen victims either to the insalubrity of the climate or the more fatal barbarity of the natives. But before tracing Lander's voyage along the Quorra, it may be necessary to give a short account of what was previously known respecting that river.¹

Herodotus, in his geographical notice of Africa, informs us, that some young persons belonging to a people who dwelt in the north of Africa, on the borders of the Mediterranean, travelled in a westerly direction from a part of Egypt, un-

Niger.

¹ It is singular enough, that two persons in the humble sphere of the brothers Lander should have succeeded in resolving the great problem of African geography, after so many able, accomplished, and adventurous men had failed, or perished in the attempt. Their good fortune entitles them to the distinction of a biographical notice.

Richard Lander was born at Truro, in Wales, on the 8th of February 1804. His parents were in humble circumstances, and his education was accordingly of the most ordinary description. He had an early propensity to wandering. "My rambling inclinations," says he, "began to display themselves in early youth. I was never easy a great while together in one place, and used to be delighted to play truant, and stroll from town to town, and from village to village, whenever I could steal an opportunity; as well as to mix in the society of boys possessing restless habits and inclinations similar to my own. I used also to listen with unmixed attention to old women's tales about the ceremonies and manners of the nations of distant regions of the earth." Domestic calamities compelled him to quit his paternal abode when he was only nine years of age, and at the early age of eleven he accompanied a mercantile gentleman to the West Indies. He was absent three years, and returned to his native country in 1818, where he entered into the service of several individuals, one of whom he accompanied to France and other countries on the Continent. An opportunity having again occurred of visiting distant regions, he traversed the colony of the Cape of Good Hope, as servant to Major Colebrooke, one of his majesty's commissioners of inquiry into the state of the British colonies. On his return to England in 1824, he accepted a situation in the establishment of a kinsman of the Duke of Northumberland, "where," says he, "my time passed away pleasantly and thoughtlessly enough, till the return of Captain Clapperton and Major Denham from the interior of Africa in the following year again roused my rambling propensities." Having heard that it was the intention of the British government to send out another expedition for the purpose of exploring the yet undiscovered parts of Central Africa, he waited upon Captain Clapperton, and was engaged by that enterprising traveller as his confidential servant. The results of this expedition are well known. After the death of Clapperton, on the 10th of April 1827, Lander sought every opportunity of conveying himself home, which, however, he did not accomplish in less than a twelvemonth, having had to make his way defenceless and alone from Saccatoo, in Houssa, to Badagry, on the western coast of Africa, a long, difficult, and dangerous journey. At length he arrived safely at Portsmouth, on the 30th of April 1828, bringing with him Captain Clapperton's journal, as well as a great deal of valuable information of his own. Being unable, from ill health, to superintend the printing of his journal, it was published in the first instance in a rough unfinished form; but it was subsequently revised and given to the world in two volumes octavo. Meanwhile the British government had engaged him to proceed to Fundah, and trace the river Quorra from that place to the sea. It was in this second expedition that he secured to his name the distinguished place which it must ever hold in the history of African discovery.

Accompanied by his brother John, who undertook the expedition without any promise of reward, Richard Lander embarked at Portsmouth on the 9th of January 1830, and arrived at Cape Coast Castle on the 22d of the following month. On the 22d of March the travellers landed at Badagry, where they were detained nine days by the mercenary chief of the place. At length they set out on their toilsome journey; and, after undergoing a variety of privations and sufferings, they, on the 17th of June, reached Boossa, on the western bank of the Quorra, which place no European had before visited except the unfortunate Park, and Captain Clapperton when he was accompanied by Lander. From Boossa the Landers proceeded up the river about one hundred miles to Yaoori, the ex-

Niger. til they came to a large river full of crocodiles, and flowing towards the rising sun; and that they were conducted by the natives to a considerable city situated on its banks. The fact of the Nile flowing from the west in an early part of its course, led the Father of History to conclude that this river was a distant branch or source of the Nile. Thus originated the first error regarding the Niger, and the weight which was attached to the opinions of Herodotus (scarcely less than belonged to those of Aristotle in a still more important branch of human knowledge) continued for ages to involve the subject in the greatest obscurity. The successive facts discovered relative to the hydrography of Africa were bent and twisted to answer the conditions of a vague hypothesis, for the truth of which there was no proof, and only the authority of a name. Notice is taken of the Niger by Strabo, but Pliny treats largely of this river, conducting it in an easterly direction, through sandy deserts, to the Nile of Egypt, and thus coinciding in opinion with Herodotus. Mela, another geographer, had the candour to confess, that when the Niger reached the middle of the continent, no one knew what became of it. Ptolemy was the first who demolished the notion that the Nile and the Niger are the same; but his account of the Niger is vague, and somewhat unintelligible. He adhered to the former opinion regarding its general direction, and considered as one river streams that were entirely distinct. But to return to Herodotus. The difficulty has been to identify the track of the travellers which he mentions, and their account of what they saw, with what is now known of the river lately discovered, and the part of Africa in which it is situated. Without going into the details of this subject, we may briefly state how the facts stand. Herodotus distinctly mentions, that the Nasamonian youth travelled

directly westward; and if so, they certainly could never have reached the Joliba or Quorra. But others assert, that as the ancients were not very accurate with regard to their bearings, the words of Herodotus are not to be interpreted strictly; and consequently, if we allow that they proceeded, not directly westward, but a little to the south, the travellers might have arrived at the river. The city to which they were conducted has been surmised to have been no other than Timbuctoo itself.¹ But it is clear, that if we allow of such latitude of meaning to the terms employed by the ancients, either in geography or any other science, there will be no end to conjecture regarding what they did or what they did not know. If Herodotus is to be taken as authority at all, we must accept of him without any emendation whatever, just as he stands; and if so, we must certainly come to the conclusion, that the Joliba or Quorra is not the great river to which he alludes. It may have been one of the many streams flowing in an easterly direction in that part of Africa which was called Segelmessa; and what seems to confirm this conjecture is, that Pliny evidently points to one of these. The celebrated Arabian geographers Abulfeda and Edrisi, and Leo Africanus, a native of Spain, all assigned to the Niger of Ptolemy a westerly course; and the two former gave it a source identical with that of the Nile, but Leo supposed it to take its rise in a lake situated to the south of Bornou, whence it was believed to flow westward to the Atlantic Ocean. The early European navigators, in their discoveries on the western coast of Africa, found successively the estuaries of the Senegal, Gambia, and Rio Grande, and believed them to be the mouths of the Niger, which was described as traversing nearly the entire breadth of Africa. In course of time they were tempted to explore the Senegal and Gambia, for the purpose of reaching

Niger.

treme point of the expedition, where they arrived on the 27th of June. The descent of the river commenced on the 2d of August, and the results of the expedition are related in the text. In their voyage downwards to the sea, their adventures were sometimes of an amusing, sometimes of an alarming character. As they proceeded, however, their difficulties and dangers increased; but these were met with the most manly and determined resolution. At Kirree they were plundered, and nearly lost their lives. On their arrival at Eboe, they were made prisoners by the king of the place, who would not consent to their liberation except on the condition of receiving a large ransom. For this sum they gave a bill on the captain of a Liverpool trader, which they ascertained was lying in the river Nun, one of the mouths of the Quorra. An obligation of a similar nature was exacted from them by the king of Brasstown, and John Lander was retained as a hostage; but he contrived to persuade the natives to allow him to proceed. The captain of the Liverpool trader treated them in a most brutal manner, and refused to make any advance whatever, although he was assured of repayment by the British government. Their bills were consequently protested, but the demand was afterwards ordered to be paid by government. On the 20th of January 1831 the travellers proceeded from Fernando Po to Rio de Janeiro, whence they set sail for England, where they arrived on the 9th of June.

The safe return of the brothers Lander, and the triumphant discovery which they had made, was the subject of warm and general congratulation. The Royal Geographical Society awarded Richard Lander a premium of fifty guineas, and for the journal of the brothers one thousand guineas was given by a London bookseller. In the disaster which befell them at Kirree, portions of the journals of both brothers were lost; but fortunately that part of each journal which was saved supplied what had been lost of the other, and a connected narrative was published in three volumes, entitled "Journal of an Expedition to explore the course and termination of the Niger, by Richard and John Lander." The domestic disposition of John Lander induced him to settle permanently at home; but Richard's love of hazardous enterprise had not yet been gratified. An expedition for the purpose of ascending the Quorra having been fitted out by some merchants of Liverpool, he was requested to undertake the direction of it, and he accepted the offer. The results of this expedition, which has been mentioned in the text, were quite unsatisfactory to the projectors, and most fatal to those who undertook it, very few Europeans having survived it. Amongst the victims was Richard Lander. The expedition which entered the river consisted of two steam-vessels, in one of which he ascended the Quorra to the junction of the Tshadda or Shary, where he left the vessel, and returned to Fernando Po, for the purpose of obtaining some medicines and other necessities. After re-joining his companions, he penetrated up the Tshadda to a considerable distance; but want of provisions compelled him to relinquish any attempt to penetrate to the sources of this river. He proceeded up the Quorra as far as Rabba, where he prosecuted an advantageous trade with the inhabitants. For the purpose of obtaining a particular species of goods for the markets in the interior, he once more descended the river to Fernando Po, from which place his last letter to his friends in England, written in high spirits, was dated. He mentioned that he was then "on his way to the interior for the third and last time." It was the last time. The party, which ascended the Quorra in two canoes, was attacked by the natives at a part of the river about seventy miles inland. Several were killed and a number wounded; amongst the latter was Richard Lander, who appears to have behaved on the occasion with the greatest bravery and self-possession. Whilst cheering his comrades, and inspiring them by his heroic example, he received a musket-ball in the hip, which made him stagger; but he continued to direct the movements of his party until the canoes were out of reach of the enemy's shot, when he sunk down exhausted from loss of blood. Having succeeded in escaping down the river to Fernando Po, every possible attention was paid to his wound, and symptoms became at last so favourable, that no doubts were entertained of Lander's recovery. But on the 6th of February 1834 mortification ensued, and so rapid was the prostration of the sufferer, that he died soon after midnight. Thus perished, in the thirty-first year of his age, Richard Lander, the humblest, but in one respect the most fortunate, of all those whose names are associated with the subject of African discovery, and who have fallen victims to their zeal in that exciting but fatal pursuit. His widow received a pension from William IV., and his daughter a handsome donation.

¹ Such is the view taken of this disputed point by Lieutenant-Colonel Leake, in the second volume of the Journal of the Geographical Society. But a writer in the Quarterly Review, whose opinion is entitled to the greatest deference, takes an opposite view, asserting that Herodotus "knew of no such river, nor even mentioned the name." (*Quarterly Review*, No. xci. p. 80.)

Niger.

the far-famed city of Timbuctoo, the immense wealth of which excited their cupidity. They traced these rivers so near to their sources as to decrease almost to rivulets, yet still they found themselves very far from the object of their wishes, and the vast central plain through which the Niger was understood to flow. In the meanwhile the French geographers De Lisle and D'Anville devoted their attention to Africa. De Lisle, in a map published in 1714, gave the sources both of the Niger and Senegal, the former being made to flow eastward and the latter westward, which was an approximation to the truth. D'Anville followed up this view in his map of Africa, published in 1749; and thus far a correct knowledge of the source and direction of the Niger was obtained, by its being separated in the east from the Nile, and in the west from the Senegal, and by having an easterly course at first assigned to it.

These views, however, appear to have been lost sight of, and the belief that the Niger followed a westerly course was generally entertained. But the formation of the African Association in England marks the commencement of a new era in the history of African geography. The first and principal object which occupied the attention of this body was the course and termination of the Niger; and a reward was held out to the person, whoever he might be, that should succeed in determining them. We pass over the names of Ledyard and Lucas, the former having died at Cairo before accomplishing any thing, and the latter having only gathered some information from the Arabs, which tended rather to perplex than elucidate the subject. The honour of determining the course of the Niger was reserved for the celebrated Mr Mungo Park, a native of Scotland, who, in the year 1795, offered to the Association his services, which were accepted. In his first journey, Mr Park explored the course of the Niger from Bammakoo to Silla, the former being, according to his account, about ten days' journey distant from its source, and the latter two hundred miles from Timbuctoo. In his second journey, undertaken at the instance of the British government, he traced the Niger as far as Boossa, where he unfortunately perished in the river, as was afterwards satisfactorily ascertained by Clapperton and Lander. After that of Park, the names of Laing, De Caille, Clapperton, and Lander, who all ascertained important facts regarding the Quorra, occur in connection with the discovery of its termination. Clapperton crossed the river at the point where Park perished, and soon afterwards died himself at Saccatoo. But Richard Lander, his faithful servant, on his return to England, volunteered to navigate the river from Boossa to its termination; his offer was accepted by the British government, and in a few months this enterprising individual accomplished the work of ages, having entered the Atlantic by the River Nun, one of the branches by which this great river discharges itself into the sea.

The source of the Quorra or Joliba, although not yet actually explored, has been ascertained by Laing to be situated in the high country of Kissi, about two hundred miles north-east by east of Sierra Leone. The branch of it which is best known is said to originate in the eastern side of Mount Loma, one of the range called the Mountains of Kong, and which appears to be a continuation of the Gibel el Kumri, or Mountains of the Moon, in latitude 9. 15. north, and longitude 9. 36. west. From Loma, this stream, under the name of Joliba, bends its course north-east through Foota Jallo and Kankan, to Couroussa, a town situated about eighty miles east from Timboo, where De Caille, travelling eastward, crossed it, and found it,

before the inundation commenced, to be 900 French feet in breadth, and nine feet in depth, with a current of two miles and a half per hour. From its great size here, only one hundred miles from its reputed source, it must have received the waters of some tributary streams; indeed, before reaching Bammakoo, it receives the Tankisso and Sarano, both of which are large rivers, one of them, flowing from Sankari in Manding, having been mistaken by Park for the Joliba itself. At Bammakoo it commences its course over the plain of Bambarra, flowing still in an easterly direction, by Yamina, Sansanding, and Sego, the capital, where it forms a noble stream, equal to the Thames at Westminster. It pursues the same course till it reaches Jinne, when it takes a bend nearly due north, in which direction it flows till it reaches Lake Dibbie, when it reverts to its easterly bearing, and continues to run in that direction till it reaches Timbuctoo. De Caille navigated the river from Jinne to Timbuctoo, and represents the banks between these places as low and marshy. Lake Dibbie is of very considerable magnitude, and stretches from east to west instead of from north to south. Below this the river was found very deep, and from half a mile to a mile in breadth, with a considerable current. Near Kabra, the port of Timbuctoo, the Joliba separates into two branches, the larger, which is about three fourths of a mile broad, bending its course east-south-east, and the smaller, about a hundred feet broad, but very deep, taking its course east by north to Kabra. The celebrated city of Timbuctoo is about eight miles north from Kabra, and, from the most accurate information which has as yet been obtained, stands in latitude 17. 30. north, and longitude 2. 30. east. From Kabra the smaller branch of the Joliba turns south-east, and joins the parent stream to the eastward, from which point there is reason to believe, although its course has not been delineated, that the Joliba flows in the general direction of its course south-east till it reaches Yaoori. From Timbuctoo to Yaoori, however, very little is known of this great river; but the fact that Park sailed down from the one place to the other fully establishes the continuity. From Yaoori to the sea it was navigated by the Landers, and was found to flow at first nearly due south, then to take a rapid bend to the east, and afterwards gradually to return and take a south-south-westerly direction to the Atlantic Ocean. Of these fortunate discoverers we shall now proceed to give some account.¹

Boossa, the first city in the vicinity of the Quorra, at which the Landers arrived, is situated on its right bank, about a mile from the river, in latitude 10. 14. north, and longitude 6. 11. east. Black rocks were seen to rise abruptly from the centre of the stream; its surface was agitated by whirlpools; and in the dry season its largest branch was not more than a stone's throw across. The travellers proceeded in a canoe from Boossa to Yaoori, between which places the river was found divided into many channels, by rocks, sand-banks, and low islands, covered with tall rank grass; and some of the channels were so shallow that their canoe was constantly grounding. They were told at Yaoori, however, that above that place, and below Boossa, the navigation was not interrupted either by rocks or sand-banks; and that after the *malea* or wet season, which sets in with fourteen days of incessant rain, canoes of all kinds pass to and fro between Yaoori, Nouffe, Boossa, and Fundah. Yaoori is a large flourishing kingdom, ruled by a hereditary sovereign, who exercises absolute despotism. The capital city, which bears the same name, is of great extent, being between twenty and thirty miles in circuit, and very popu-

Niger.

¹ When the articles AFRICA, BENIN, and some others connected with the geography of this quarter of the globe, passed through the press, the result of the Landers' expedition was not known; so that a more ample narrative of their discoveries is necessary in this place, to supply any deficiency which may be found in our geography of Africa.

Niger. lous; but, from the low nature of the banks of the river, it was found very swampy. Returning to Boossa, and sailing downwards, the Quorra was found completely navigable to a finely-wooded island called Patashie; but from thence to Lever or Layaba, a distance of about twenty miles, the channel is so full of rocks and sand-banks, as to render the passage very difficult. From Lever all the way down to the ocean, the Quorra is a broad and noble stream, varying from one to six, but being most commonly between two and three miles in breadth. The banks in some places were flat and marshy, but elsewhere presented the most pleasing aspect. They are described as "embellished with mighty trees and elegant shrubs, which were clad in thick and luxuriant foliage, some of lively green, others of darker hues; and little birds were singing merrily among the branches. Magnificent festoons of creeping plants, always green, hung from the tops of the tallest trees, and, drooping to the water's edge, were pleasing and grateful to the eye." Further down, the river is bordered by lofty mountains, seemingly forming part of the great chain which crosses Africa in this latitude, but which has not been sufficient to arrest the course of this mighty stream. These eminences are described as gloomy and romantic, fringed with stunted shrubs, which overhang immense precipices; and their recesses are tenanted only by wild beasts and birds of prey. Even in the mid-channel, a rocky islet called Mount Kesa rises to the height of 300 feet; and its steep sides, fringed with magnificent trees, present a majestic appearance. The island Zagoshie is one of the most remarkable spots in all Africa. It is about fifteen miles in length and three in breadth, in the midst of the Quorra, the broad channel of which on either side separates it from the continent. The surface is very low, and muddy, yet throughout well cultivated, and extremely productive. The manufactures of this place are highly valued, and superior to any in the kingdom of Nouffe or Tappa, to which it belongs. The largest and most flourishing city of this domain is Rabba, situated about two miles from Zagoshie, in latitude 9. 14.,

and between five and six hundred miles from the sea. The surrounding country abounds in the most valuable grains, in horned cattle of remarkable size, and in horses much admired for their strength and beauty.

Below Zagoshie and Rabba the Quorra flows almost due east for upwards of a hundred and twenty miles, presenting throughout a magnificent body of water, at one place nearly eight miles broad. The shores are generally well cultivated and inhabited; and at one point two very large cities appeared on the opposite banks. Towards the end of this reach the Quorra is joined by a large stream from the north-east, called the Coodonia. About twenty miles lower is Egga, a very large town built close to the river, in a situation low, and liable to inundation. The inhabitants trade both up and down the river; and here were found Portuguese cloths, brought from Benin. Egga is the boundary town of Nouffe, and closes on the south that range of flourishing and comparatively well-governed countries which here extend along both banks of the Quorra. The river now flows east-south-east along a fine country, covered with numerous villages, the principal being Kacunda, which consists of three large villages, all under the absolute sway of a single chief. The river then takes a direction nearly due south, and, at the distance of three or four days' journey below Egga, is joined by another river nearly as large as itself, falling in from the north-eastward. This is the Tshadda, Shar, or Shary; and Lander was informed that Fundah, of which Clapperton heard so much when at Saccatoo, was at the distance of three days' journey on the banks of this river, and not, as had been supposed, on those of the Quorra. This fact was verified some years afterwards by Mr Laird,¹ who, in his voyage up the Quorra, ascended the river Tshadda (uniformly designated Shary in his work) for six or seven days, when he entered a creek, from the extremity of which a land journey of about ten miles conducted him to Fundah, a large and populous town. Below the confluence of the rivers Quorra and Tshadda the course of the river is south-south-west, and

¹ See Narrative of an Expedition into the Interior of Africa, by the River Niger, in the steam-vessels Quorra and Alburkah, in 1832-33-34, by Macgregor Laird and R. A. K. Oldfield, surviving officers of the expedition, London, 1837, in two vols. 8vo. With regard to the source of the Tshadda our information is meagre and inconclusive. Mr Laird made many inquiries respecting it, and the invariable answer was, that it came from the great Lake Tshad or Tchad. One person, indeed, a native of Kooka, offered to take him up there in twelve days, without changing the canoe. The confidence of this assertion is very much like that of a person who had already performed the voyage; but, from the mendacious propensities of the natives, Mr Laird is not inclined to admit the correctness of this account, and thinks that the river has its rise in another and very different quarter. Fortunately he assigns his reasons for drawing this conclusion, by which we are enabled to form an independent judgment on the point.

"The water of the Shary," says he, "is colder than that of the Niger. The rise of the river commences sooner and more suddenly than the Niger. There is little trade upon the Shary in comparison with the Niger, which, if it communicated with the Sea of Soudan, would naturally be immense. From the three first reasons, I should think that its rise is in a mountainous country, and that that country lies very near the equator." With all deference to this judicious traveller, we think that at least two of his reasons for differing from the popular opinion go directly to confirm it. In the first place, the water of the Shary being colder than that of the Quorra, is just what would happen if the source of the river were a large reservoir of water, such as we know the Lake Tshad to be. A great body of water, as is well known, is kept permanently colder than a small one under the same circumstances; the stream issuing from the former, therefore, and flowing only 500 miles (which is probably more than the limit that ought to be assigned to the course of the Shary, supposing it to originate in Lake Tshad), will beyond all doubt be colder than one which has traversed nearly 3000 miles in a tropical climate, becoming swelled during its long course only by a great number of small tributaries, and, from its shallow depth when compared to a large inland sea, having its temperature raised considerably higher by the influence of the solar beams. Secondly, the rise of the river taking place sooner than is the case with the Niger, and also more suddenly, clearly proves, that at the commencement of the wet season it receives all at once a great accession to its waters, which would be the case if it flowed from a large lake into which a number of large rivers, having short courses, discharged their waters simultaneously; and, according to the best authorities, Lake Tshad is the basin into which a great number of streams from the surrounding country are poured, these, when compared with the Quorra, or even with the Shary, having but short courses. The river Quorra, on the contrary, becomes augmented in size by a multitude of smaller streams which enter it at different intervals during a course of nearly 3000 miles; consequently they must affect the main stream, at its confluence with the Shary, slowly and gradually, not all at once. Besides, it appears from the facts of the case, that before the tributaries which join it previously to its reaching Timbuctoo have taken effect at the point referred to, a considerable portion of what may be called the overplus waters received during the rainy season, and joining the Quorra below Timbuctoo, has already partially augmented the parent stream at its junction with the Shary, and passed on to the Atlantic. The two reasons which Mr Laird brings forward as opposed to the opinion of the Shary being a river flowing from Lake Tshad, seem to us therefore to be remarkably favourable to such an hypothesis. Indeed, in the absence of direct evidence to the contrary, we are strongly inclined to think that this is the fact. With regard to Mr Laird's third reason, that the trade on the Shary is smaller than it would be if it communicated with Lake Tshad, nothing satisfactory can be advanced until we know more of the countries in the interior. Lander was informed that the Tshadda or Shary flowed through large and fruitful kingdoms, and that an extensive commerce and active navigation were carried on by means of it. We can see nothing in its mere trade to make either for or against its originating in a great lake, providing it be navigable to a great distance into the interior of a populous country; and this is certainly the case.

Niger.

its width, as usual, varies from two to five or six miles. Opposite to Bocqua, a considerable town situated below the junction of the Tshadda, is the common path to the city of Fundah; and here both banks of the river continue hilly and well wooded, and are thickly studded with towns and villages. Of this town Mr Laird observes, "Bocqua, or Hickory, as the natives call it, is the centre of this trade (in slaves, cloth, and ivory), and a fair of three days' duration is held there every ten days, attended by Eboe, and Attah, and even Bonny traders from the south, and those from Egga, Cuttum-Curaffe, and Fundah on the north [north-east?], besides great numbers from the interior country on both banks of the river. The traders from the upper country bring cloths of native manufacture, beads, ivory, rice, straw-hats, and slaves, all of which they sell for cowries, and buy European goods, chiefly Portuguese and Spanish. About twenty-five large canoes passed us every ten days, on their way to this market, each containing from forty to sixty people. The trade is carried on by money, not by barter; cowries are the circulating medium, and their sterling value on an average may be taken at one shilling per thousand." Still farther down is the town of Attah or Iddoh, picturesquely situated on a hill overhanging the river, in some places with cliffs 300 feet in height. Standing above the alluvial soil at the entrance of the valley of the Quorra, and thus removed from damp, it is healthy, and, according to Mr Laird, commands at present the whole trade of the interior. The same traveller informs us, that above this town the river forces its way through a chain of mountains which he calls Kong, being in all likelihood a part of the range already mentioned as traversing this part of Africa. They seemed to be of nearly equal height, apparently from 2500 to 3000 feet above the level of the river, and had all flat summits. They are probably composed of sandstone resting upon granite, of which latter rock large masses were found in the vicinity of the river. About forty-five miles below the junction of the Tshadda with the Quorra, and on the left bank of the latter river, stands the town of Abbazacca; and still farther down Damuggoo, at which place Lander found that the Quorra fell two feet in as many days, yet still overflowed the town. European goods here made their appearance in considerable abundance, consisting of powder, muskets, soap, Manchester cottons, and other manufactures, together with large quantities of diluted rum, in all which articles the natives trade to Bocqua, where they receive in exchange ivory and slaves, which, again, are sold to European traders. Some ten or fifteen miles below Damuggoo a stream flows in from the eastward; but this, Lander thinks, is a branch previously separated from the main stream, and on his map it is made to enclose the large towns of Abbazacca and Damuggoo, together with a number of villages. At the reunion of this stream with the Quorra stands Kirree, a large market-town, at which place the great delta of the Quorra may be said to commence, extending south-westerly to the mouth of the river Benin, and south-south-east to that of Old Calabar. At Kirree a great branch was seen to go off to Benin; but it is not till the traveller reaches Eboe, a large town seventy miles farther down the river, that it begins to separate into those numerous channels which intersect the country in every direction, and enter the Atlantic by so many estuaries. At a little distance above Eboe a large branch runs to the westward, terminating also, it is said, at Benin, but more probably in one of the numerous rivers to the south-south-east of that estuary. Another large branch goes off at the same place, flowing to the south-east, apparently towards Old Calabar and the Rio del Rey, two large estuaries. At the point where these two arms of the Quorra strike

off, the river spreads out into a vast lake, which is said to receive a number of small rivers. Niger.

In sailing down from Kirree to Eboe, the Landers found a complete change from the beautiful and smiling aspect which nature had presented on the upper banks of the stream. The country became almost throughout an alluvial swamp, covered with vast entangled forests, which concealed the villages. Grain and cattle had disappeared from the fields, and the sole subsistence of the inhabitants was derived from the produce of the trees, from roots, the banana, the plantain, the yam, and from the fish caught in the river. The Quorra abounds in fish, and the inhabitants of the banks are expert and persevering fishermen. They make immense nets of grass, which they use as seines with great dexterity. The palm-tree, also, is not only an extensive article of trade, but affords a refreshing juice. Eboe is situated on the side of a creek running parallel with the Quorra, and in the flooded season communicating with it at both extremities. It may contain about six thousand inhabitants, who are the most enterprising and industrious traders on the river. The town itself, with the immediate vicinity, is unhealthy, owing to the swampy nature of the ground. The staple trade of Eboe consists of slaves and palm-oil, the latter being produced in immense quantities; and yet so plentiful are the trees which yield it, that, Mr Laird says, not the twentieth part of the natural produce is collected. But as long as the slave-trade exists, it is vain to look for the development of industry and commerce in these countries. Is it likely that the natives will explore the palm forests whilst the atrocious practice of kidnapping them on every convenient occasion is carried on by Europeans and Americans? Industry, however, would soon follow security, and the trade in palm-oil might be rendered exceedingly valuable to Europe. Below Eboe, the branches thrown off by the Quorra on both sides are large and numerous, and that which forms the Bonny may perhaps claim to be considered as the main stream. The Brass River, however, flowing in a direction nearly south-west from Eboe, and entering the Atlantic at Cape Formosa, was that by which the Landers reached the sea. The next points to be considered are, the extent of the Quorra, its tributaries, and the size and character of its delta.

"If we measure two distances," says an able writer on this subject,¹ "one from the source to Timbuctoo, and the other from that city to the sea, we shall have nearly 2000 miles, which may be considered as the direct course; and the various windings must raise the whole line of the stream to upwards of 3000 miles. For several hundred miles of its lower course it forms a broad and magnificent expanse, resembling an inland sea. The Niger must, after all, yield very considerably to the Missouri and Orellana, those stupendous rivers of the new world; but it appears as great as any of those which water the old continents. There can rank with it only the Nile and the Yang-tse-kiang, or Great River of China. But the upper course of neither is yet very fully ascertained; and the Nile can compete only in length of course, not in the magnitude of its stream, or the fertility of the regions which it waters. There is one feature in which the Niger may defy competition with any river, either of the old or new world. This is in the grandeur of its delta. Along the whole coast, from the river of Formosa or Benin, to that of Old Calabar, about three hundred miles in length, there open into the Atlantic its successive estuaries, which navigators have scarcely been able to number. Taking this coast as the base of the triangle or delta, and its vertex at Kirree, about a hundred and seventy miles inland, where the Formosa branch separates, we have a space of upwards of 25,000 square miles,

¹ Edinburgh Review, No. cx. p. 415.

Niger. equal to the half of England. Had this delta, like that of the Nile, been subject only to temporary inundations, leaving behind a layer of fertilizing slime, it would have formed the most fruitful region on the earth, and might have been almost the granary of a continent. But unfortunately the Niger rolls down its waters in such excessive abundance, as to convert the whole into a huge and dreary swamp, covered with dense forests of mangrove and other trees of spreading and luxuriant foliage. The equatorial sun, with its fiercest rays, cannot penetrate these dark recesses; it only exhales from them pestilential vapours, which render this coast the theatre of more fatal epidemic diseases than any other, even of Western Africa. That human industry will one day level these forests, drain these swamps, and cover this soil with luxuriant harvests, we may confidently anticipate; but many ages must probably elapse before man, in Africa, can achieve such a victory over nature."

These broad estuaries of the Quorra communicate with each other by creeks, and, frequently overflowing their banks, render the shore a vast alluvial wooded morass for more than twenty miles inland. The natives, having thus far extended water communications, are the most active traders anywhere in Africa; but, excepting slaves, the commodities in which they deal are now entirely changed. Gold has given place to ivory, which is collected in considerable quantities; but palm-oil is the great staple of the eastern districts. A vast quantity of salt is made at the mouths of the rivers, both for consumption at the spot and in the interior. The first leading feature is the river Formosa, which is two miles wide at its mouth; and on a creek tributary to it stands the capital of Benin. The surrounding territory is well cultivated, although not so completely cleared of wood as it might be. Jatto, about fifty miles below, is the port of Benin, and is accessible to vessels of sixty tons. The trade on this river has greatly declined from what it once was. Warré or Owarri is another state and city, situated on another creek, communicating with the Formosa on its opposite side. It consists of a somewhat elevated and beautiful island, surrounded by vast woods and swamps. After doubling Cape Formosa, and passing several estuaries, we come to that of the Brass River, called by the Portuguese the river of Nun. This, though not the largest estuary of the Quorra, is most directly in the line of the main stream, and being that by which Lander entered the Atlantic, it at present enjoys the reputation of being the principal channel. It is divided into two branches; but the navigation is greatly impeded, and the trade limited by a dangerous bar at its mouth. Brass Town is not built on either of the great branches, but on one of the numerous creeks connected with both, and in a country overgrown with impenetrable thickets of mangrove. It is a poor place, divided by a lagoon into two parts, each of which contains about a thousand inhabitants. Bonny River forms the next important estuary, having on its opposite sides the towns of Bonny and New Calabar, which, being only a few miles up, are situated in the midst of the morasses which overspread all this country. The people support themselves by the manufacture of salt, and they likewise trade in slaves and palm-oil. To the eastward of Bonny is the estuary of Old Calabar River, the broadest of all, and navigable for large vessels sixty miles up to Ephraim Town, which is governed by a chief who assumes the title of duke. It carries on a considerable trade, and contains about four thousand inhabitants. To this river succeeds that of Rio del Rey, and then the Rio Cameroons. The country yields a good deal of ivory and palm-oil. The continuity of the vast wooded flat which extends along the coast for more than two hundred miles is now broken by some very lofty mountains, the principal of which is supposed to reach the height of 13,000 feet.

We have seen that, besides its own ample stream, the Quorra has a number of tributaries. Not far above the point where the delta commences, the Tshadda enters, being nearly equal in magnitude to the Quorra itself. A little higher up the Coodonia enters; it is a smaller river, but still of great importance in a commercial point of view, as Lander had seen it flowing through a very fertile and highly cultivated country. Considerably higher up is the Cubbie, a large stream from the country and city of that name; and higher up still is the Quarrama, which passes by Zirmie and Saccatoo. Between this point and Timbuctoo we are ignorant of how many or what streams join the Quorra, nor is the tributary which passes that city of any great importance. But, at the eastern boundary of Bambarra, Mr Park describes the influx from the south of two great streams, the Maniand and Nimma; and it seems very doubtful if De Caille was not mistaken in supposing the latter to be a mere branch of the Quorra. The higher tributaries descending from the mountains swell the stream, without themselves affording any important navigation.

An interesting question, and one which has occupied a considerable degree of attention, here presents itself, namely, what prospect does this great interior communication open to British commerce? Our intercourse with this part of Africa has hitherto been almost exclusively with the coast, which is comparatively unproductive, whilst its inhabitants are idle and miserable. Inland, however, we find the people improve, and the country become fertile to luxuriance, and gradually more healthy. The territories rendered accessible by the Quorra and its tributaries are undoubtedly the most productive and industrious in all Africa; and their population, notwithstanding the difficulty of forming any precise estimate, can scarcely be rated at less than about twenty-five millions. Considerable results might reasonably be anticipated, from British enterprise having found access to such a region. But there are two great drawbacks to active intercourse with the interior of Africa; the insalubrity of the climate, and the inhuman traffic in slaves, which last is a thousand times more destructive to trade than all the forms which disease ever assumed. If this were removed and the confidence of the natives restored, our commerce with Africa by means of the Quorra might be greatly increased. In the mean time, the late failure of Macgregor Laird and Oldfield will probably for a time damp the ardour of enterprise, and our commercial relations with this quarter of Africa may remain, for years to come, on nearly the same footing as before. (R. R. R.)

NIGHT, that part of the natural day during which the sun is underneath the horizon; or that time when it is dark or dusky. Night was originally divided by the Hebrews and other eastern nations into three parts or watches. But the Romans, and after them the Jews, divided the night into four parts or watches; the first of which began at sunset, and lasted till nine at night, according to our way of reckoning; the second lasted till midnight; the third extended to three in the morning; and the fourth ended at sunrise. The ancient Gauls and Germans divided their time, not by days, but by nights; the Anglo-Saxons followed the same method of reckoning; and the people of Iceland and the Arabs do the same at this day. The length and shortness of the night or of darkness is according to the season of the year and position of the place; and the causes of this variation are now well known. See ASTRONOMY.

NIGHT-WATCHING, a practice of very remote antiquity, and which belongs to the oldest regulations of police. As early as the time of Solomon we find mention made of it, and likewise in the Psalms of David. Sentinels were stationed in different places in Athens and in other cities of Greece, and they were kept to their duty by the visita-

Night.

Nigidius
Figulus.

tions of the *thesmothetæ*. There were also *triumviri nocturni* in the city of Rome, as we learn from the commentaries of Henback on the police of the Romans. It appears, however, that the design of these institutions was rather the prevention of fires than the guarding against alarms or dangers by night, although in process of time attention was likewise paid to these objects. The apprehension of fires was the pretext of Augustus, when he wished to strengthen the night-watch for suppressing nocturnal commotions.

It does not appear that the practice of calling out the hours became established before the erection of city gates. It most probably had its rise in Germany; yet it would have been attended with advantage in ancient Rome, where there were no public clocks, nor any thing in private houses to indicate the hours. The various periods for soldiers to mount guard were determined by water-clocks; at the end of each hour they blew a horn, and by means of this signal every individual was apprised of the hour of the night. It seems evident, however, that these regulations were only attended to in time of war.

In the city of Paris, as at Rome, night-watching was established at the very commencement of the French monarchy; and De Lamare quotes the ordinances of Clothaire II. upon this subject, in the year 595. The citizens at first kept watch in rotation; but this practice was afterwards set aside, and, by the payment of a certain sum of money, a permanent watch was established. In the opinion of the learned and indefatigable Beckmann, the establishment of single watchmen, to call out the hours through the streets, was peculiar to Germany, and has only been copied by surrounding nations in more modern times. The elector John George, in 1588, appointed watchmen in Berlin; and Mabillon describes it as a practice peculiar to that country. Horns were made use of by watchmen in some places, and rattles in others; the former being most proper for villages, and the latter for cities.

The Chinese, as early as the ninth century, had watchmen posted upon their towers, who announced the hours both by day and by night, striking forcibly on a suspended board, which in that country is said to be in use to the present period; and at St Petersburg the watchmen employ a suspended plate of iron for a similar purpose. In this manner also Christians are assembled together in the Levant, for the purpose of attending divine service; and at an early period monks were thus awakened in monasteries to attend to the proper hours of prayer.

We find mention made of steeple-watchmen in Germany in the fourteenth century. In the year 1563, a church-steeple was erected in Leisnig, and an apartment built in it for a permanent watchman, who was obliged to proclaim the hours every time the clock struck. In the fifteenth century permanent watchmen were kept in many of the steeples at Ulm. The same thing was practised at Frankfurt on the Mayne, at Oettingen, and in many other places; and Montaigne records his astonishment at finding a man on the steeple of Constance, who kept watch upon it continually, and who upon no pretext whatever was permitted to descend.

NIGIDIUS FIGULUS, PUBLIUS, one of the most learned men of ancient Rome, who flourished at the same time with Cicero. He wrote on various subjects, but his pieces appeared so refined and difficult that they were not regarded. He assisted Cicero, with great prudence, in defeating Catiline's conspiracy, and did him many services in the time of his adversity. He adhered to Pompey in opposition to Cæsar, which occasioned his exile; and he died in banishment. Cicero, who had always entertained the highest esteem for him, wrote to him a beautiful consolatory letter, the thirteenth of the fourth book of his *Epistolæ ad Familiares*.

NIGRITIA, NEGROLAND, or SOUDAN, a general name for a considerable portion of the interior of Africa, some parts of which are as yet unknown, while some have been only recently explored by Clapperton, De Caille, Lander, and others. It comprises a great number of kingdoms, large and small, each of which will be found described under its own head. It appears to include all those countries which are situated between the sixth and seventeenth degrees of north latitude, and the eighth degree of west and thirty-second degree of east longitude. They are represented in maps as stretching along both sides of the Niger, and cluster around the great Lake Tshad or Shary. Still farther to the east, in the neighbourhood of the Bahr-el-Abiad or White River, one of the great branches of the Nile, is the country of the Shilluks, comprising Donga, Kordofan, Darfur, and Bergoo. The other chief states are Bambarra, Timbuctoo, and Kong, on the west; and Houssa, Burgou, Yarriba, Nouffe or Nyffe, Fundah, Bornou, Mandara, Be-gharmi, Kanem, and others, in the centre. These, although widely scattered, will, if taken as a whole, be found to be bounded on the north by the Sahara, on the east by Nubia, on the south by the Mountains of the Moon and Lower Guinea, and on the west by Senegambia. As thus defined, Nigritia is about 2500 miles from west to east, 500 from north to south, and has a superficial area of 1,250,000 square miles. A considerable portion of this territory is traversed by the Niger. In the centre is Lake Tshad, into which some large rivers empty themselves. For an account of this vast inland sea, and the surrounding country, the reader is referred to the article **BORNOU**. There are several high ranges of mountains, such as those of Kong and Donga; some of the summits of the Mountains of the Moon are covered with perpetual snow. The nature of the climate, the productions and other particulars regarding this portion of Africa, will be found described in the article **AFRICA**.

NIJIBABAD, or NIJIBGUR, a town of Hindustan, in the province of Bareilly. It was built by a Rohilla chieftain, as a mart for the Cashmere trade, and is situated on the north branch of a small river which runs into the Ganges. Long. 78. 41. E. Lat. 29. 35. N.

NIKOLAJEW. See **NICOLAIEV**.

NIKOLSK, a circle in the Russian province of Wologda, extending from east longitude 43. 45. to 47. 59., and from north latitude 58. 10. to 60. 25., being 13,156 square miles in extent. It is an elevated district, sloping both to the north and the south, and is the source of several rivers running in both directions. It is moderately productive, affording corn in average years sufficient for its scanty population, which does not exceed 65,000 persons. Nearly one half of the surface is covered with wood. The capital, of the same name, stands on the river Jug, and depends on the river navigation. Long. 45. 30. E. Lat. 59. 8. N.

NIKOLSKOI, a small town of Asiatic Russia, in the government of Oufa, on the Oural. It is eighty miles east-south-east of Orenburg.

NILCUND, a town of Northern Hindustan, and one of the celebrated places of Hindu pilgrimage, situated among the Himalaya Mountains, on the frontiers of Thibet. The cold at this place is intense; and at the end of June or beginning of August, when it is chiefly visited, the road is nearly impassable on account of the depth of snow. Avalanches are common on the road, and glaciers are seen in various parts. In the vicinity of this place there is a colossal statue of Gunneis; but the temple is dedicated to Mahadeva, one of whose numerous names is Nilcund, or Blue Throat. Long. 88. 50. E. Lat. 27. 51. N.

NILCUNDAH, a town of Hindustan, in the province of Hyderabad, forty-two miles south-east from Hyderabad, and the capital of a district of the same name. Long. 79. 15. E. Lat. 16. 55. N.

Nigritia
||
Nilcundah.

Nile.

NILE, a large and celebrated river of Africa, which flows through Nubia and Egypt. A general account of this celebrated stream has already been given in the article EGYPT, and more particularly of its course below Assouan, where it enters the long valley of Egypt; but important information having been obtained from recent travellers, especially regarding the upper courses of its two main forks, the Bahr-el-Abiad or White River, and the Bahr-el-Azrek or Blue River, it is necessary to give here some account of each of these branches.

The knowledge which the ancients possessed of the river Nile was much more perfect than that which they had acquired of the river Niger. Eratosthenes, the librarian of Alexandria, who flourished about 220 years before Christ, had a knowledge of the entire course of the river more correct than has been attained by moderns until a recent date;¹ and if his remarks be compared with those of Artemidorus, Strabo, and Ptolemy, it will be found that little information was ever added to that of Eratosthenes, regarding either the Nile or its branches, which form the great peninsula of Meroë. Eratosthenes distinguishes three great branches of the Nile; the first or most easterly being the Atbara or Tacazze; the second the Astapus or Bahr-el-Azrek; and the third the Nile proper, to which the two former are tributaries, namely, the Bahr-el-Abiad. He places lakes at the head of the Blue and White Rivers, and in so doing is followed by Ptolemy, who assigns an enormous extension southwards to the Blue River. In considering the White River the real Nile, he agrees with Herodotus, inasmuch as the historian states that the Nile came from the westward, and that the Automoli were at a distance above Meroë equal to that of Meroë above Elephantine; thus placing the Automoli on the White Nile, in the country now inhabited by the Denka. Under the Ptolemies the Greeks exploded the vulgar error which prevailed in the time of Herodotus, of supposing that the rivers of Western Africa flowed to the Nile. The opinion that lakes were situated at the sources of the two main branches of this great river having been found correct with regard to the Blue Nile, there is some reason for presuming that the Nile proper may have a similar origin; "and if," as Colonel Leake says, "we suppose Ptolemy to have placed the two lakes of the Nilus, or White River, twelve degrees to the south of their real position, as he is proved to have placed the Lake Coloe at the source of his Astapus, or the Abyssinian branch, it will follow that the lakes of the White River are about the latitude of five degrees north." This, of course, is merely conjectural; nor is it very philosophical to determine the latitude in which a river rises on the ground of a presumed error.

Our information regarding this great and unsolved problem of African geography, viz. the source of the Bahr-el-

Abiad, is derived from three modern authorities, Browne, Linant, and Ibrahim Kashef, who headed a party sent out by the viceroy of Egypt in order to capture slaves in the distant regions of Soudan. Browne, it is well known, penetrated some degrees to the south of Darfur; and his inquiries went to prove that the sources of the river were situated about latitude seven degrees north and longitude twenty-seven degrees east, not in lakes, but in many streams flowing from the Gibel-el-Kumri, or Mountains of the Moon. It may be remarked, that this is precisely the name given by Ptolemy to the mountains at the source of the Nile; and Denham also found it attached to a part of the same great range farther to the westward. Linant, who travelled for the African Association in 1827, surveyed the course of the White Nile from the confluence of the Blue River to Aleïs, a direct distance of 132 geographical miles. But the most recent information is that of Ibrahim Kashef, who set out from Khartum, at the fork of the two great branches. This expedition, divided into two parties, marched for thirty-five days along both banks of the river. On the twelfth day they reached the first island of the Shilluks, traversed the territory of that people for fifteen days, and on the twenty-ninth day entered that of the Denka, from which they returned at the end of six days. The river was then shallow, and full of islands, six hours in breadth, and there were no mountains to be seen. "The latter part of the march," says Colonel Leake, "appears, from the description of Ibrahim, to have been in a direction nearly west; so that if the first island of the Shilluks, which they reached on the twelfth day, was not far from Aleïs, as Linant's journal gives reason to believe, the extreme point obtained by them was about twenty-nine degrees east longitude, and ten degrees north latitude. The result of the last expedition agrees with that of Browne's, inasmuch as it gives an easterly course to that part of the river which lies to the south of Darfur, and as it makes the sources of the river to fall to the south-westward of that kingdom, not farther northward than seven degrees north. It supports the opinion also that Browne's Donga is no other than the country of the Denka; that both the sources and mountains are more distant than Browne's information supposed; and still leaves the possibility, therefore, that Ptolemy was right in describing the river as originating in lakes. In fact, the enormous breadth attributed to the river by the Turkish slaving party, although it may be an exaggeration, and is certainly not to be reckoned by the usual allowance of the itinerary hour, leaves little doubt that the river, at the extreme point of their journey, was much broader than at its junction with the Blue Nile; and indicates, therefore, that its conformation is of an extraordinary kind, its origin being perhaps in a lake or lakes, which may be supplied

Nile.

¹ "Eratosthenes," says Colonel Leake, "was well informed on the course of the Nile above Egypt, and particularly as to the great south-western bend of Dongola, which was scarcely known to the moderns before the journey of Burckhardt into Nubia. It was from Eratosthenes that Strabo derived his information on the peninsula of Meroë, and it was probably from the same source that Artemidorus of Ephesus learnt that the city of Meroë was fifteen days distant from the sea. Eratosthenes described the island of Meroë as formed of two branches of the Nile, named Astaboras, now Atbara, and Astapus; but added, that the latter was sometimes called Astasobas, while the name Astapus was applied to another river rising in certain lakes to the south, meaning the White River. This agrees with Ptolemy, inasmuch as he clearly attaches the name Astapus to the Blue or Abyssinian Nile, and derives the Nilus, or proper Nile, that is to say, the White River, from lakes situated far to the south. On the other hand, Artemidorus, Strabo, and Pliny, followed those authorities alluded to by Eratosthenes, who gave the name Astapus to the White Nile, and that of Astasobas to the Blue River. The latter name may be accounted for by the discoveries of late travellers; from whom we learn, that on the right bank of the Bahr-el-Azrek, or Blue River, a little above the fork at Khartum, there are some ruins called Soba, apparently of the same age as those of Meroë; whence it would seem that Astasobas meant the river of Soba, and that the Ast, which enters into the composition of this and the two other names of the rivers of Meroë, implies *river*, having probably been introduced into that country by the Egyptian Greeks from Macedonia, where we find its elements, doubtless with the same import, in the names Astræus, Strymon, and perhaps also the modern Vistritza. Astapus, in fact, was the name of a Macedonian city (now called Istib), and not improbably of the river also upon which the town is situated. When the Blue Nile had generally assumed the appellation of Astasobas, that of Astapus may still have distinguished the united stream as far as the junction of the Astaboras, and may at length have become attached also to the White River above the fork, by a process which has often changed the names of rivers, especially when formed of two nearly equal branches. The Scamander of Troy is a remarkable instance. The Simoeis of Homer was the Scamander of the time of Strabo." (*Journal of the Geographical Society*.)

Nile.

by streams flowing from a distant range of mountains. The existence of lakes having a communication with the river only in time of high water is rendered highly probable by a passage in the journal of M. Linant, which states, that at the time of the inundation of the White River, an incredible quantity of fish is brought down towards Khartum by the current.¹ This is all the knowledge we possess regarding the source of the Nile proper, which, in spite of Bruce, still remains the same problem as it has ever been. Regarding the Egyptian expedition, Colonel Leake observes, "As a want of success alone caused the return of the Turkish slaving party, the natives constantly eluding their pursuit, it seems evident, that if geographical discovery, instead of man-stealing, had been their object, they might have explored the river much farther; and that it might consequently be in the power of the viceroy of Egypt to arrive at the mysterious sources, or to escort an European mission thither, if a motive sufficiently powerful should ever prompt him to assist in the attempt. In the mean time, a route by water, in the direction of the sources of the White Nile, is now afforded from the westward by means of the newly-discovered branch of the Quorra, called Shary, or Shadda, or Tshadda, which, being one mile and a half at its junction with the Quorra, is probably navigable for a great distance above the confluence."² There are great doubts, however, of the river Shary ever aiding in the discovery of the sources of the Nile, inasmuch as it probably has its origin in Lake Tshad, which is situated at least ten degrees west-north-west from the reputed sources of this great stream. Nor are our hopes that the problem will speedily be resolved at all raised by the Egyptian expedition; for the proceedings of the viceroy in hunting for slaves on the banks of the river has so exasperated the natives against the whites, that they will allow no opportunity of making reprisals upon them to escape. Such at least is the opinion of Mr Hoskins. "The source of the Nile could only," he thinks, "be discovered by an armed force; and even that method would present great difficulties. It would require a large army to subdue the great extent of country through which the Bahr-el-Abiad probably passes. Not only the chiefs, but the whole population, instead of any of them joining the standard of the invader, or furnishing him with provisions, would resolutely oppose him. Each man would fight with desperation for the preservation of his property, family, and liberty."³ Besides, they thirst for vengeance on all Mahomedans and white men, and the circumstance of their being French or English would not avail. "They distinguish but two races, Pagan and Mahomedan, and two colours, black and white, their friends and enemies."

The voyage of M. Linant along the Bahr-el-Abiad having thrown considerable light on its character near to the point of junction, we shall present a brief analysis of his journal. From the mean of this traveller's astronomical observations, a small island placed just at the junction of the Bahr-el-Abiad with the Blue River is situated in latitude 15. 34. north, and longitude 32. 30. 58. east from Greenwich. On ascending the river, it was found in many places a mile and a half in width, and even then was far within its regular banks, which sometimes seemed about four miles apart, and were distinctly marked beyond a wide sandy beach destitute of any appearance of verdure. Even this is not the extreme breadth when the river is at its greatest height, as it then overflows the adjoining country to a considerable extent, especially to the westward, the eastern bank being the higher, although on both sides the general

aspect of the country is flat. The farther banks are covered on the eastern side with wood of stunted growth, rooted chiefly in the sand; on the western side it is of larger size, growing on a better soil. The borders of the river were crowded with water game, such as wild geese, pelicans, swans, and the like. On being repeatedly sounded, the depth was always found to be from three to four fathoms. Farther up, the river was found to be somewhat narrower, the eastern shore to be lower, and both banks very richly wooded, with fine verdure clothing it close to the water's edge. Fish were taken in abundance by the natives, and hippopotamuses and crocodiles swarmed everywhere. Numerous islands were passed at intervals, some of them beautiful spots covered with tall trees of a splendid green, and thickly set with herbaceous plants. Multitudes of birds were found upon them; and from the trunks of trees bee-hives were easily procured. The Shilluks came from a distance for the sole purpose of obtaining this honey, and chasing the hippopotamuses. Aleis was the highest point attained by M. Linant; and the following are the conclusions which he draws from the voyage: "The Bahr-el-Abiad is undoubtedly the principal of the two rivers which form by their junction the Nile of Egypt. It discharges a greater volume of water than the Bahr-el-Azrek; and although somewhat narrower immediately at the confluence than it is higher up, it is, even in this respect, equal to the Blue River. The colour of its waters is also that which characterises the conjunct stream in the dry season, the Bahr-el-Azrek being then of a greenish hue, while the Bahr-el-Abiad is always white, and as it were soapy, even during the inundations, when the Bahr-el-Azrek becomes reddish, from the nature of the detritus brought down by the Bahr-Toumat, which falls into it in the province of Fasuolo. And the Bahr-Mogren, or northernmost branch of the Nile, also brings down at this time a quantity of black earth, which influences the general colour."⁴ "I have been unable," he continues, "to obtain any precise information as to the origin of the Bahr-Abiad, none but the Arabs called Corouns and the Wed Abrof pretending to know any thing of it. Hassan, the sheikh of Fasuolo, a well-informed man for his country, and who has travelled a great deal in the adjacent districts, gave me, however, some particulars, which induce me to believe that it cannot rise in a lower latitude than Fasuolo.⁴ For the merchants who go directly west from that province into the country of the Negroes, and those who traverse the countries south of Darfur and Kordofan, along nearly the same road, and in the same parallel of latitude, as the Coroun Arabs, the Bagarras, the Wed Abrof, &c. all agree in saying that they pass no river west of Fasuolo, excepting the Toumat, and some slight streams which are nearly dry in the summer season; and that during the same season they have no water in their encampments along the skirts of the Ethiopian chain, which extends east and west a great distance, except what they find in the beds of torrents or among the rocks. When I asked them, also, why they did not rather follow the banks of the Bahr-Abiad, they always answered me that it passed a long way north of them; and that, beyond the Shilluks, it came directly from the west quarter.

"It is certain that, in the country of the Shilluks, there are other rivers which come from the west; and the following is a list of them in the order in which they are met in ascending the stream. First, the *Nid-el-Nil*, or Feast of the Nile, which passes close under the mountain called Guebel Dahir, or Mountain of the Round, so

Nile.

¹ Journal of the Geographical Society, vol. ii. p. 26.

³ Hoskins' Travels in Ethiopia above the Second Cataract of the Nile, London, 1835, 4to.

⁴ The journey of Ibrahim Kashef, already mentioned, is adverse to this opinion; and not less so the result of the oral information obtained from Mehemet Bey, by M. Ruppel, in Kordofan.

² Ibid.

Nile. called because it is ascended spirally. It is covered with negro villages, is situated in the country of the Tagalla, and the river which passes to the south of it is said to flow from a great lake, to which I heard several names given, none of which I shall therefore recite. Several other rivers are reported to fall into it, the first called the Bahr-Soudan,¹ the second the Suar, the third the Hor-el-Karna, the fourth the Serat, and the fifth the Hor-el-Nahal, besides some others.

"The Sheikh Hassan of Fasuolo also told me, that south of the Shilluks the Bahr-Abiad is lost in some extensive lakes, which stretch away to the westward, and communicate with each other during the inundations, the intervening country being flat and marshy. And the remarks which I made on the stream agree well with this statement, neither gravel nor sand indicative of its being fed by torrents being found in it, and its shoals being all clay, proving that it does not come from mountains, but from a country of the same nature; or, at least, that if it does originate in mountains, it has a long subsequent course over a country of an opposite kind; whence its source cannot possibly be in the Mountains of the Moon, or, at least, in the place where they are marked in our maps. Besides all which, another remarkable fact seems to me to prove indubitably that it comes from a system of lakes; namely, the prodigious quantity of fish which arrive with the freshes at their first appearance; for these fish can only come from lakes, where they remain imprisoned when the waters are low, and escape when the inundation takes place."

At the point of its junction with the Bahr-el-Azrek the Bahr-el-Abiad is about eighteen hundred feet across; but, as we have already observed, it enlarges much a little above, its banks being frequently three or four miles apart, and in some places during the inundations the waters extend twenty-one miles from side to side. "It is said that they are specifically lighter," says M. Linant, "and more wholesome for use, than those of the Azrek; it is certain, at least, that the banks of the Abiad are much the more healthy." The cause of the comparative heaviness of the waters of the Azrek here mentioned, is no doubt to be attributed to the presence of earthy matters held in suspension by the waters, being part of the "detritus brought down by the Toumat," as described by M. Linant. But the statement regarding the superior salubrity of the waters of the Abiad is quite at variance with that of Mr Hoskins. "I have been assured by several Arab merchants, and also Turks," says he, "that the water of the river is less sweet than that of the Azrek, that the caravans stationed on what they call the island, between the two rivers, universally prefer the water of the latter. The Egyptians, therefore, are indebted to the Azrek for the singular sweetness of the waters of the Nile."² Mr Hoskins continues: "The Arabs' invariable description of the Bahr-el-Abiad is, that it has waves like the Red Sea, but the current is not powerful like that of the Blue River; that a boat would sail rapidly up, on account of the prevailing northerly winds, but it would be more difficult to descend. It is not improbable that the reason of the superior rapidity of the Blue River is its proximity to its source in the mountains, whilst the Bahr-el-Abiad may pass through immense districts, where the surface is more level and uniform."³ The shores of the Abiad are in general very flat, especially on the western side; and the water is only deep towards the middle of the stream. On the western

side the bank is composed of a deposit from the river, without any sand; but, on the opposite side, it is entirely of a yellowish sand, not brought down by the river, but by the south-east winds during the winter; and this being stopped by the river, forms hillocks, which give this side a greater elevation, and the descent from it to the water a greater declivity than on the opposite shore. Hence, also, the water on this side is a little deeper. The rise of the Bahr-el-Abiad is not perceptible till some time after that of the Bahr-el-Azrek. Below the junction the general aspect of the Nile has much more of the character of the Bahr-el-Azrek than that of the Bahr-el-Abiad, excepting in the colour of its waters during the dry season. In every respect it resembles the former as to the nature of its banks and adjoining scenery, its width, sinuous course, sand-banks, and the want of large shells, such as are only to be found on the shores of the Bahr-el-Abiad. Below, also, as well as along the banks of the Bahr-el-Azrek, there are comparatively few aquatic birds, whilst near the Bahr-el-Abiad they are innumerable. Lord Prudhoe thus compares the two rivers: "The banks of this river (the Bahr-el-Abiad) are low and flat, presenting a succession of grass lawn, and fine trees of the harrez (accacia). No scenery can be more unlike the Nile, whilst the Bahr-el-Azrek is its facsimile; the same high banks forming steppes from the annual inundations, bare of trees, but eminently fertile from the rich deposit of the river; whilst the Bahr-el-Abiad, stretching into wide lakes during the inundation, leaves the soil so sterile, that neither corn nor other crops, not even doorraah, can be grown when the waters subside; in lieu springs up grass, a production nearly unknown in Egypt. Here we saw a bird like the ibis, never seen on the Nile; it was black and white, with a curved beak, as represented in Egyptian sculpture. Many of the picus species were also flying about, with feathers of blue and red. The fish, too, of the Bahr-el-Abiad are peculiar to that river, and are not found in the Nile."⁴ Such is a summary of the facts ascertained regarding the main branch or artery of the Nile.

The Bahr-el-Azrek, the other branch, flowing from the south-east, rises in Abyssinia, and joins the Bahr-el-Abiad under the parallel before specified. The province of Gojam, in which it rises, is very mountainous; and numerous streams which have their origin in this chain flow first eastward and form the great lake of Dembea, one of the most conspicuous features of Abyssinian geography. That which appears to be the largest of these issues from two fountains in Sacala, near Geesh, and after flowing into the lake, and quitting it on its eastern shore, sweeps in a semicircular direction round the provinces of Damot and Gojam, flowing first in a westerly course, and then taking its main bearing, which is north-north-west. The result of about forty observations of Bruce places these fountains in east longitude 36. 55. 30. and 10. 59. 25. north latitude. The mercury in the barometer stood at twenty-two inches, which indicates an altitude of more than two miles above the level of the sea. This river is considered in Abyssinia as the real Nile, and was so regarded by Bruce. All the Portuguese travellers and missionaries, from whom alone our early information is derived, were impressed with the same idea. It is not, therefore, wonderful that Bruce embarked on his arduous undertaking of penetrating to its sources under this impression; and that, after having placed his glory in the discovery, he should have admitted slowly and with cau-

¹ In a former journey of M. Linant, he was informed by some Takrouiri pilgrims from Dar Sille, that they travelled two months on the Bahr-Abiad before they arrived at Sennaar; that, before arriving at the Abiad, they followed the course of another river upwards; and that the Abiad had its rise in a country called Bahr-el-Lesse, from which some of the waters flow towards Marok, or Morocco, that is, to the north-west.

² Hoskins' Travels in Ethiopia, above the Second Cataract of the Nile.

³ Journal of the Geographical Society, vol. v. part i. p. 41.

⁴ Ibid. p. 119.

Nile.

tion the observation of D'Anville, that the Bahr-el-Abiad, admitted to be the greater stream, even by the traveller himself, had in all respects the best title to be considered as the Nile of the ancients. But even granting that it is not, the admission will deduct little from the achievement of Bruce, whose journey to the fountains of Geesh, through wild and unexplored regions, must ever be regarded as one of the noblest instances of human daring, directed by judgment and science.

In its northerly course, the Bahr-el-Azrek, or Blue River, receives an accession of several considerable streams, amongst which are the Beto and Bahr-Toumat, flowing in on the western side, and the Dender, Rehat, and Rabat, which unite with it on the eastern side. The waters of the Bahr-Toumat are very considerable during the freshes, but at other times they are so dried up as not even to flow. When it begins to rise, however, it does so with such rapidity and violence as to carry every thing before it, the noise of its approach being thus heard at a considerable distance, and taken as a signal to escape from its banks with the utmost precipitation. At Sennaar, which is about one hundred miles above the junction of the Blue and White Rivers, Bruce describes the former as a "delightful river, above a mile broad, full to the very brim, but never overflowing. Everywhere on these banks are seen numerous herds of the most beautiful cattle of various kinds."... "The banks of the Nile about Sennaar resemble the pleasantest parts of Holland in the summer season; but soon after, when the rains cease, and the sun exerts his utmost influence, the dorra begins to ripen, the leaves to turn yellow and to rot, the lakes to putrefy, smell, and be full of vermin, all this beauty suddenly disappears." The principal tributary of the united streams of the Azrek and the Abiad, called variously the Tacazze, Atbara, Astaboras, Sittet, and Mugrum, falls into it in east longitude 34. 5. and in north latitude 17. 40. This river rises in Abyssinia, and flows through a great portion of it, draining all the high chains of mountains in its western part. The streams which combine to form the main river spread over a wide tract of country, and are very numerous, which is partly the cause of the Tacazze having so many names. Its principal tributaries are the Mareb and Mogreu (the Mareb of Bruce), the latter joining it not far from its confluence with the Nile. Here Bruce found it a quarter of a mile broad, and very deep, flowing through a parched, desert, and barren country, its banks having lost the beauty which clothed them whilst it flowed through Abyssinia. Mr Hoskins gives a more particular account of it. "Opposite to Unmatur is the junction of the Mugrum, the ancient Astaboras, with the Nile, which is comparatively clear at this season (March). I perceived also that the taste was different, and that it had a strong disagreeable smell."... "The width of the Mugrum, as the Astaboras is now called, from what I could learn, is, at the time of the rise, about a thousand feet. At this season they tell me it is almost stagnant. It swells many days earlier than the Bahr-el-Abiad or the Azrek; and I think the green colour that tinges the whole Nile for the first thirty or forty days after its rise may be attributed to the influx of the waters of this river. The chief province or district on its banks is called Atbara, evidently a corruption from the ancient name of the river, which is curious, as any analogy is rarely to be found between the modern and ancient names in this country."... "From the best information I have been able to obtain, there are seven days' journey from the mouth of the Mugrum to Goss Radjeb, the principal village on its banks: for the first two days the direction of this river is nearly east."¹ Mr Hoskins was also informed by some intelligent

Nile.

Arabs, that the Mugrum abounds much more than the Nile in hippopotamuses and crocodiles, and that the western bank is infested with lions. This river, along with the Nile, and its branch the Bahr-el-Azrek, encloses a tract of country called Meroë, which obtained from the ancients the name of Island. See MEROE.

After the junction of the Bahr-el-Azrek with the Bahr-el-Abiad, the Nile takes a very remarkable bend, which, as it appears on the map, cannot be better described than by saying that it resembles an irregular letter, S, the upper part, inclining to the left. This immense tortuosity extends from about the sixteenth to nearly the twenty-third degree of north latitude. To give a detailed account of the Nile and its banks during this long course, would only be to present an ever-recurring picture of the same objects. The width of the Nile varies exceedingly, being sometimes more than a mile, and at other times only about a quarter of a mile, in breadth. It is studded with innumerable islands, some of which are of very considerable size, and clothed with the richest vegetation. The banks of the Nile, also, are often picturesque and beautiful; and the portions of land which may be said to be enclosed by the bendings of the river contain a much greater extent of cultivated soil, and support a larger population, than any part of Lower Nubia. The whole of the country, however, which has been subjected to cultivation, can only be described as a long and narrow oasis, that has been rescued from the surrounding desolation by the river which traverses it. Dongola is the name of the territory most remarkable for its fertility and beauty. High granitic rocks enclose the green and cultivated valley of Jarjar, which flourishes in freshness and fertility in the bosom of the wildest waste. Immediately beyond it there is a pass called the Water's Mouth, particularly celebrated for the grandeur of its scenery. It is formed by a succession of huge detached masses of naked rock, and of large fragments scattered along the plain. Below is the large island of Argo, a spot of peculiar and striking fertility, forming in the bosom of the desert the most luxuriant natural garden. About ten miles above it is Maragga, El Ourde, or New Dongola, the last name having been given to it by the Mamelukes, who, during their temporary occupation of this country, made it their capital.

Before the Nile enters Egypt there occur those cataracts of the river so celebrated in antiquity, and so much exaggerated by some modern travellers. The first is situated about three miles above the island of Elephantine, in latitude 24° north. The beauty of this green spot on the waters strikes all travellers with admiration; by the natives it is termed the Island of Flowers, and travellers call it the Garden of the Tropics. It presents, indeed, within the space of a mile in length and a quarter of a mile in breadth, a verdure and fertility equal to the finest parts of Egypt. Whether or not the body of water of the Nile has, in the course of ages, worn or rather broken down the precipices over which the river once rushed, we cannot say; but this is certainly not at all probable. However, the thundering sound of the cataracts which was said to compel the inhabitants to remove to a distance from the deafening commotion, is no longer to be heard. It does not appear that there is at present any considerable fall, the highest not being above five feet in perpendicular descent. A picturesque and extraordinary scene, however, is produced by the Nile dashing through the wild confusion of granite rocks, with which its bed for several miles is thickly strewn. The rocky chain which stretches along either bank, presenting projections of every form, meet and cross in the middle of its course. The river, which above flows in calm majesty upwards of a mile in breadth, is here narrowed to

¹ Hoskins' Travels in Ethiopia above the Second Cataract of the Nile.

Nilometer. half that space; and its stream, forcing its way through the innumerable islets situated above, amidst, and below the cataract, boiling and foaming amidst a thousand rocks, presents a scene of peculiar grandeur and effect. The water in the different channels is tossed about in every direction, forming numberless little cascades; and the noise, resembling that of a tempestuous ocean beating on a rocky shore, is in winter and spring very formidable, being heard at the distance of three miles. There are six of these cataracts enumerated by travellers, besides some falls of inconsiderable size, although not surrounded by picturesque scenery. The most celebrated is the second cataract, situated at Wady Halfa, in latitude 21. 50. north. This cataract has also disappointed travellers, who expected to find it a mighty waterfall. Like the first, it is formed by a multitude of rocky islands, through which the Nile dashes amidst clouds of foam, and is whirled and tossed in perpetual eddies. The rocks consist of a species of black marble, not of granite, and the islets being covered with patches of verdure, and several of them being even inhabited, produce a picturesque effect, which relieves the aspect of desolation characteristic of the first. The fifth cataract is not to be compared to either the first or second for picturesque effect. "There are here no mountains or even hills," says Mr Hoskins, "and the fall at a little distance is scarcely perceptible. The sound is great, the rapids strong, and of such an extent, that at this season of the year (February) certainly no boat of any size could pass; when the Nile is high there would be little difficulty." The other cataracts do not require any particular notice. It is clear that they are rather what the Americans call rapids than what we are accustomed to associate with the name of cataract; a series of inconsiderable falls, remarkable rather for their number and the picturesque scenery adjacent thereto, than for any other circumstance or peculiarity.

The Nile enters Egypt at Assouan, near the site of the ancient Syene, in latitude 24° north. It follows nearly a northerly course, and below Cairo (latitude 30. 15. north) divides into two main arms; the Damietta or the eastern, and the Rosetta or western branch. A description of this, the most important part of the course of the Nile, has already been given at sufficient length in the article EGYPT, to which the reader is referred, as well as for an account of the inundation and other circumstances connected with this great river. As to the length of its course, the distance from the confluence of its two head branches to the sea has been estimated at 1500 miles, and from its highest sources at 2500 miles. (R. R. R.)

NILOMETER, an instrument used amongst the ancients to measure the height of the water of the river Nile during the periodical inundation. The word comes from *Νεῖλος*, Nile, and *μετρον*, measure. The Greeks more commonly called it *Νεῖλοσκόπιον*. The nilometer is said, by several Arabian writers, to have been first set up, for this purpose, by Joseph during his regency in Egypt; and the measure of it was sixteen cubits, this being the height of the increase of the Nile which was then necessary to the fruitfulness of Egypt.

From the measure of this column, Dr Cumberland deduces an argument, in order to prove that the Jewish and Egyptian cubits were of the same length. In the Royal Library of Paris there is an Arabic treatise on nilometers, entitled *Neil fi alnal al Nil*, in which are described all the overflowings of the Nile, from the first to the 875th year of the Hegira. Herodotus mentions a column which had been erected in a point of the island of Delta, to serve as a nilometer; and there is still one in a mosque at the same place.

The following is Bruce's account of the nilometer. "On the point of the island Rhode, between Geeza and

Cairo, near the middle of the river, is a round tower enclosing a neat well or cistern lined with marble. The bottom of this well is on the same level with the bottom of the Nile, which has free access to it through a large opening like an embrasure. In the middle of the well rises a thin column of eight faces of blue and white marble, of which the foot is on the same plane with the bottom of the river. This pillar is divided into twenty peeks, of twenty-two inches each. Of these peeks the two lowermost are left, without any division, to stand for the quantity of sludge which the water deposits there. Two peeks are then divided, on the right hand, into twenty-four digits each; then on the left, four peeks are divided into twenty-four digits; then on the right, four, and on the left another four; again, four on the right, which completes the number of eighteen peeks from the first division marked on the pillar. Thus the whole, marked and unmarked, amounts to something more than thirty-six feet English." (See Bruce's Travels (vol. iii.), and also the article EGYPT.)

NIMBUS, in *Antiquity*, a circle observed upon certain medals, or around the heads of some emperors, answering to the circles of light drawn round the images of saints.

NIMETULAHITES, a description of Turkish monks, so called from their founder Nimetulahi, famous for his doctrines and the austerity of his life.

NIMROD, the sixth son of Cush, and to all appearance much younger than any of his brothers, since Moses mentions the sons of Raamah, his fourth brother, before he speaks of him. What the sacred historian says of him is short; and yet he says more than of any other of the posterity of Noah, till he comes to Abraham. He tells us that "Nimrod began to be a mighty one in the earth;" that he was "a mighty hunter before the Lord," even to a proverb; and that "the beginning of his kingdom was Babel, and Erech, and Accad, and Calneh, in the land of Shinar."

From this account Nimrod is supposed to have been a man of extraordinary strength and valour. Some represent him as a giant; all consider him as a great warrior. It is generally thought that by the words "a mighty hunter," is to be understood that he was a great tyrant; but some of the rabbins interpret these words favourably, thinking that Nimrod was qualified by peculiar dexterity and strength for the chase, and that he offered to God the game which he caught; and several of the moderns are also of opinion that this passage is not to be understood of his tyrannical oppressions, or his hunting of men, but only of beasts. It must be owned that the phrase "before the Lord" may be taken in a favourable sense, and as a commendation of his good qualities; but the generality of expositors and commentators understand it otherwise.

Hunting must have been one of the most useful employments in the times immediately after the dispersion, when all countries were overrun with wild beasts, of which it was necessary that they should be cleared, to render them habitable; and therefore nothing seemed more proper to procure a man esteem and honour in those ages than his being an expert hunter. By that exercise, we are told, the ancient Persians qualified their kings for war and government; and hunting is still, in many countries, considered as part of a royal education.

There is nothing in the short history of Nimrod that carries the least air of reproach, excepting his name, which signifies a *rebel*; and that is the circumstance which seems to have occasioned the injurious opinions which have been entertained respecting him in all ages. Commentators, being in general prepossessed in favour of the opinion that the curse of Noah fell upon the posterity of Ham, and finding this prince stigmatised by such a name, have interpreted every passage relating to him to his disadvan-

Nimbus
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Nimrod.

Nimrod. tage. They represent him as a rebel against God, in persuading the descendants of Noah to disobey the divine command to disperse, and in setting them on to build the tower of Babel, with an impious design of scaling heaven. They brand him as an ambitious usurper and an insolent oppressor, and make him the author of the adoration of fire and idolatrous worship, as well as the first persecutor on the score of religion. On the other hand, some account him a virtuous prince, who, far from advising the building of Babel, left the country, and went into Assyria, because he would not give his consent to that extravagant project.

Nimrod is generally thought to have been the first king after the Deluge, though some authors, supposing a plantation or dispersion prior to that of Babel, have thought that there were kings in several countries before his time. Mizraim is conceived, by many who contend for the antiquity of the Egyptian monarchy, to have begun his reign much earlier than Nimrod; and others, from the uniformity of the languages which were spoken in Assyria, Babylonia, Syria, and Canaan, affirm that those countries must have been peopled before the confusion of tongues.

The four cities which Moses gave to Nimrod constituted a large kingdom in those early times, when few kings had more than one; only it must be observed, that possessions might at first have been large, and afterwards divided into several parcels; and Nimrod being the leader of a nation, we may suppose that his subjects were settled within those limits. Whether he became possessed of those cities by conquest or otherwise, does not appear. It is most probable he did not build Babel, all the posterity of Noah seeming to have been equally concerned in that affair; nor does it appear that he built the other three cities, although the founding of them, and many more, besides other works, are attributed to him by some authors. It may also seem a little strange that Nimrod should have been preferred to the regal dignity, and enjoyed the most cultivated part of the earth then known, rather than any other of the elder chiefs or heads of nations, even of the branch of Ham. Perhaps it was conferred on him for his dexterity in hunting, or it may be that he did not assume the title of king till after the death of his father Cush, who might have been settled there before him, and left him the sovereignty; but we incline to think that he seized Shinar from the descendants of Shem, driving out Ashur, who went from thence and founded Nineveh, and other cities in Assyria.

The Scripture does not inform us when Nimrod began his reign. Some date it before the dispersion; but such a conjecture does not seem to suit with the Mosaical history; for before the dispersion we read of no city but Babel, nor could there well be more whilst all mankind were yet in a body together. But when Nimrod assumed the regal title there seems to have been other cities, and this shows that he must have done so a considerable time after the dispersion. The learned writers of the Universal History place the beginning of his reign thirty years after that event, and in all likelihood it should be placed rather later than earlier.

Authors have taken a great deal of trouble to find Nimrod in profane history. Some have imagined him to be the same with Belus, the founder of the Babylonian empire; and others take him to be Ninus, the first Assyrian monarch. Some believe him to have been Evechous, the first Chaldaean king after the Deluge; and others perceive a great resemblance between him and Bacchus, both in actions and in name. Some of the Mahomedan writers suppose Nimrod to have been identical with Zohak, a Persian king of the first dynasty; whilst others contend for his being Kay Kaus, the second king of the second race; and some of the Jews say that he is the same with Amraphel, the king of Shinar, mentioned by Moses. But there is no certainty

in these conjectures, nor have we any knowledge of his immediate successors. Nimwegen
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Nineveh.

The Scripture mentions nothing respecting the death of Nimrod. Some of the rabbins pretend that he was slain by Esau, whom they make his contemporary. There is a tradition that he was killed by the fall of the tower of Babel, when that structure was overthrown by tempestuous winds. But others say, that when he led an army against Abraham, God sent a squadron of gnats, which destroyed most of them, and particularly Nimrod, whose brain was pierced by one of those insects.

NIMWEGEN, a city of the province of Guelderland, in the circle of the same name, in the Netherlands, comprehending six cantons, and 51,100 inhabitants. Of this circle Nimwegen is the capital. It stands on the left bank of the river Waal, over which there is an excellent flying bridge. It is situated on five hills, in a rich and pleasant district, and is well fortified. The streets are wide and clean, and the houses large and well built, and it has some agreeable promenades adjoining to it. In 1830, it contained 1900 houses, and 17,734 inhabitants, viz. 8402 males and 9332 females. Its chief trade consists in brewing, tanning, bleaching, distilling, and making Prussian blue, tobacco, snuff, and sealing-wax. It is celebrated for the peace concluded there in 1678 and 1679. Long. 5. 35. 21. E. Lat. 51. 51. 20. N.

NINE, the last of the radical numbers or characters, from the combination of which any definite number, however large, may be produced. "It is observed by arithmeticians," says Hume, "that the products of 9 compose always either 9 or some lesser products of 9, if you add together all the characters of which any of the former products is composed. Thus of 18, 27, 36, which are products of 9, you make nine, by adding 1 to 8, 2 to 7, 3 to 6. Thus 369 is a product also of 9; and if you add 3, 6, and 9, you make 18, a lesser product of 9." (See Hume's Dialogues on Natural Religion, p. 167, 168, 2d edit.)

NINE ISLANDS, a cluster of small islands in the Pacific Ocean, which were so called by Captain Carteret. Long. 154. 30. E. Lat. 4. 40. S.

NINEVEH, the capital city of Assyria, which was founded by Ashur the son of Shem (Gen. x. 11); or, as others read the text, by Nimrod the son of Cush. However this may have been, it must be owned that Nineveh was one of the largest and most ancient cities of the world. It is very difficult to assign exactly the time of its foundation; but it cannot have been long after the building of Babel. It was situated upon the banks of the Tigris; and in the time of the prophet Jonas, who was sent thither under Jeroboam II. king of Israel, and, as Calmet thinks, under the reign of Pul, father of Sardanapalus, king of Assyria, Nineveh was a very great city, its circuit being three days' journey (Jonah, iii. 3). Diodorus Siculus, who has given us the dimensions of this city, says that it was 480 stadia, or forty-seven miles, in circumference, and that it was surrounded with lofty walls and towers; the former being 200 feet in height, and so very broad that three chariots might drive along them abreast, and the latter 200 feet in height, and 1500 in number; and Strabo allows it to have been much greater than Babylon. Diodorus Siculus was, however, certainly mistaken in placing Nineveh on the Euphrates, since all historians as well as geographers who speak of that city, tell us in express terms that it was situated on the Tigris. At the time of Jonah's mission thither, it was so populous that it was reckoned to contain more than six score thousand persons who could not distinguish their right hand from their left (Jonah, iv. 11), which is generally explained of young children who had not yet attained to the use of reason; so that upon this principle it is computed that the inhabitants of Nineveh were then above 600,000 persons. Nineveh was taken by Arbaces and Belesis, in the year of

Ningpo
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Ninians,
St.

the world 3257, under the reign of Sardanapalus, in the time of Ahaz, king of Judah, and about the epoch of the foundation of Rome. It was reduced a second time by Astyages and Nabopolassar, who took it from Chynaladanus, king of Assyria, in the year 3378. After this time, Nineveh no more recovered its former splendour. It was so entirely ruined in the time of Lucianus Samosatensis, who lived under the Emperor Hadrian, that no traces of it could be found, nor so much as the place where it stood. However, it was rebuilt under the Persians, and again destroyed by the Saracens about the seventh century.

NINGPO, a city of the first rank, and a great seaport, of China, in the province of Tchekiang, known to the early Portuguese navigators under the appellation of Siampoo. It is five miles in circumference, is situated in a fertile plain surrounded by hills, and is watered by numerous canals. It is much resorted to by the Chinese merchants of Fokien, as well as by those settled in Siam and Batavia, who repair thither for the purpose of buying the silks produced in its neighbourhood. It also carries on an extensive trade with Japan. Long. 120. 14. E. Lat. 29. 51. N.

NINIA, or NINIAN, commonly called *St Ninian*, a holy man amongst the ancient Britons. He resided at or near a place called by Ptolemy *Leucopibia*, and by Bede *Candida Casa*; but the English and Scotch called it *White-horne*. He is said to have been the first who converted the Scots and Picts to the Christian faith, which he effected during the reign of Theodosius the Younger. Bede informs us that he built a church dedicated to St Martin, in a style unknown to the Britons of that time; and adds, that during his time the Saxons held this province (*Gallowidia*, now *Galloway*), and that, as the converts to Christianity increased in consequence of the labours of this saint, an episcopal see was established there. Dr Henry, considering that few or none of the writings of the most ancient fathers of the British church are now extant, and that we can know but little of their personal history, and the extent of their erudition, gives a short account of some of them. Of St Ninian, he says that he was a Briton of noble birth and excellent genius. "After he had received as good an education at home as his own country could afford, he travelled for his further improvement, and spent several years at Rome, which was then the chief seat of learning as well as of empire. From thence he returned into Britain, and spent his life in preaching the gospel in the most uncultivated parts of it, with equal zeal and success."

NINIANS, St, a large village in the parish of the same name in Scotland, about one mile and a quarter distant from Stirling. It has an ancient appearance, and consists of one large narrow street. Many of the houses are of considerable antiquity, and on them are carved the implements employed in the trade of the original proprietor. During the rebellion in 1745-46, the former church of St Ninians was used by the Highlanders as a powder magazine, and was accidentally blown up on their hurried departure for the north. The steeple, however, escaped unscathed from the general destruction, and now stands separated from the new church. Besides the parish church, there is in the village a relief chapel. Between St Ninians and the village of Bannockburn, which is situated at a short distance to the east, was fought the famous battle known by that name. The parish of St Ninians is also celebrated for being the scene of two other battles; that of Stirling, which was fought in 1297, when the Scottish army, under the command of Sir William Wallace, entirely defeated the English; and that of Sauchieburn, where the forces of James III. were defeated by those of his nobility, and the king put to death in a mill not far from the field, to which he had been carried. The inhabitants are chiefly employed in the manufacture of nails and leather; the former are

considered as superior to those made in England. A considerable trade is also carried on in the manufacturing of carpets, tartan, and other stuffs of the same kind, five hundred of the inhabitants being thus employed. The population of the parish amounted in 1821 to 8274, and in 1831 to 9552.

NINON DE L'ENCLOS, a lady of a noble family, born at Paris in the year 1615, and famous for her wit and her gallantries. Her mother was a person of exemplary piety, but her father early inspired her with the love of pleasure. Having lost her parents at fourteen years of age, and finding herself mistress of her own actions, she resolved never to marry. She had an income of ten thousand livres a year; and, according to the lessons she had received from her father, drew up a plan of life and gallantry, which she pursued until her death. Never delicate with respect to the number, but always so in the choice, of her pleasures, she sacrificed nothing to interest, but loved only whilst her taste for it continued, and had amongst her admirers the greatest lords of the court. Notwithstanding the levity of her conduct, however, she had many virtues. She was constant in her friendships, faithful to what are called the laws of honour, of strict veracity, disinterested, and more particularly remarkable for perfect probity. Women of the most respectable characters were proud of the honour of having her as their friend; at her house there was an assemblage of every thing most agreeable in the city and the court; and mothers were extremely desirous of sending their sons to that school of politeness and good taste, that they might learn sentiments of honour and probity, and those other virtues which render men amiable in society. But Madame de Sevigné remarks with great justice in her letters, that this school was dangerous to religion and the Christian virtues, because Ninon made use of seducing maxims, capable of depriving the mind of those invaluable treasures. This singular woman was esteemed beautiful even in old age, and is said to have inspired the passion of love at eighty. She died at Paris in 1705.

NINUS, the first king of the Assyrians, is said to have been the son of Belus. It is added, that he enlarged Nineveh and Babylon; conquered Zoroaster, king of the Bactrians; married Semiramis of Ascalon; subdued almost all Asia; and died after a glorious reign of fifty-two years, about 1150 before Christ. But all these alleged facts are apocryphal.

NIO, an island of the Archipelago, situated between Naxi on the north, Armago on the east, Santerino on the south, and Sikino on the west, and about thirty-five miles in circumference. It is remarkable for nothing but Homer's tomb, which it is pretended is in this island, where he is said to have died in his passage from Samos to Athens. Long. 25. 35. E. Lat. 36. 43. N.

NIOBE, according to the fictions of the ancient poets, was the daughter of Tantalus, and the wife of Amphiion, king of Thebes, by whom she had seven sons and as many daughters. Having become so proud of her fertility and high birth, as to prefer herself before Latona, and to slight the sacrifices offered up by the Theban matrons to that goddess, Apollo and Diana, the children of Latona, resented this contempt; the former slew the male children, and the latter the female, upon which Niobe was struck dumb with grief, and remained without sensation. Cicero was of opinion, that on this account the poets feigned that she had been turned into stone.

NIONS, an arrondissement of the department of the Drome, in France, 435 square miles in extent. It comprehends four cantons, divided into seventy-four communes, and containing a population of 35,554 persons. The capital is the city of the same name situated on the river Aigues. It contains only 3208 inhabitants, who carry on some trade in silks, woollens, and leather.

Ninon de
l'Enclos
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Nions.

Niort
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Nisan.

NIORT, an arrondissement of the department of the Two Sèvres, in France, extending over 533 square miles. It contains ten cantons, which are divided into ninety-four communes, and inhabited by 100,208 persons. The capital, both of the arrondissement and the department, is the city of the same name, situated on the navigable river Sèvres-Mortaise. It has a fine Gothic church, an athenæum, with a library of 12,000 volumes, a chemical laboratory, a botanic garden, and a cabinet of physical preparations. In the year 1836 it contained 18,197 inhabitants, who find occupation in making woollen goods, and in preparing leather, chiefly for gloves, of which about 20,000 dozen pairs are annually produced. It suffered much in consequence of the insurrection in La Vendée during the Revolution, but has in a great degree recovered since the return of tranquillity. Long. 0. 34. 32. W. Lat. 46. 20. 8. N.

NIPHON, an extensive island in the east of Asia, forming by much the largest portion of the empire of Japan. It is of an irregular form, with numerous windings, and is 800 or 900 miles in length, but in average breadth it does not exceed 100. The spiritual and temporal capitals of Jedo and Macao are situated in this island; but for a particular account of these the reader is referred to the article JAPAN.

NIPPERS, in the manège, are four teeth in the fore part of a horse's mouth, two in the upper and two in the lower jaw. The horse puts them forth between the second and third year.

NIRGUA, a town of Colombia, in South America. It is situated upon a low mountain ridge, which extends from the Sierra Nevada of Merida to the north-east, separating the head waters of the Apure and Orinoco from the streams which fall into the Carribbean Sea, or the Lake of Maracaybo. The climate is very hot, and not at all salubrious, which, with other causes, has contributed to reduce the city; the latter is now in decay, and contains only about three thousand inhabitants. Depons describes the people as robust and strong, but lazy, and addicted to every species of vice. They consist wholly of Zamboes, that is, a mixed race, composed of negroes and Indians. There are some gold mines situated in the valley of Nirgua; and silver is likewise found in the vicinity. Nirgua is in lat. 10° north, and long. 71° 10' west of Paris, about forty-eight leagues west of Caraccas.

NIRMUL, a town of Hindustan, in the province of Berar, and district of Nandere, belonging to the nizam. It is situated four miles north of the river Godavery. Long. 79. 33. E. Lat. 19. 18. N.

NISAN, a month of the Hebrews, corresponding to our March, but which sometimes takes from February or April, according to the course of the moon. It was the first month of the sacred year at the period of the exod from Egypt (Exod. xii. 2), and it was the seventh month of the civil year. By Moses it is called Abib. The name Nisan is only found since the time of Ezra, and the return from the captivity of Babylon. On the first day of this month the Jews fasted for the death of the children of Aaron. On the tenth day was celebrated a fast for the death of Miriam the sister of Moses, and every one provided himself with a lamb for the passover. On this day the Israelites passed over Jordan under the conduct of Joshua. On the fourteenth day, in the evening, they sacrificed the paschal lamb; and the day following, being the fifteenth, was celebrated as the solemn passover. On the sixteenth they offered a sheaf of the ears of barley as the first fruits of the harvest of that year. The twenty-first, being the octave of the passover, was solemnized with particular ceremonies. On the twenty-sixth the Jews fasted in memory of the death of Joshua; and this day they commenced their prayers to obtain the rains of the spring. On the twenty-ninth they called to mind the fall of the walls of Jericho.

NISHAPOUR, an ancient city of Persia, formerly one of the richest and greatest in the extensive province of Khorassan, is situated in a fine plain, about eighty miles in length by fifty or sixty in breadth, well studded with fine villages, and plentiful gardens full of trees, which bear fruits of the highest flavour. According to Frazer, in his Narrative of a Journey into Khorassan (p. 432), it was a rich and pleasing scene, and by far the most populous and cultivated tract he had seen in Persia. This plain was formerly irrigated by 12,000 aqueducts, which have now been suffered to fall into decay, and are destitute of water. The city has suffered deeply from the wars which have at different times desolated Persia. It was destroyed by Alexander the Great, and was, after the lapse of many years, rebuilt by Sapor I., whose statue was to be seen at Nishapour until it was overturned and broken in pieces by the Arabs. About the middle of the twelfth century Nishapour was taken by the Tartars, and so completely ruined by those barbarians, that the inhabitants, on their return, could not distinguish the site of their own houses. Hakani the Persian poet, who flourished at this period, describes, in the most affecting terms, the overthrow of this great city. It recovered from this ruin, however, and once more regained its former splendour, when it was again taken and pillaged by the savage Genghis Khan, and reduced to desolation. The inhabitants amount at present to about 15,000, who occupy only a single quarter of the city, the ruins of which are said to cover a circuit of twenty-five miles. The most delicious fruits are here found in the greatest abundance. The city is at present subject to the dominion of the king of Persia, and has nine districts dependent on it, each of which contains about ten walled villages. It is thirty miles south of Meshed, and 230 north-east of Herat.

NISHEGOROD, a province of the Russian empire, in Europe. It takes its name from the capital city, and extends in north latitude from 54. 31. to 56. 4., and in east longitude from 41. 37. to 46. 27., containing 21,142 square miles. It is divided into eleven circles, which comprehend thirteen cities and 5380 villages, which latter are formed into 762 parishes, each having a Greek church. The inhabitants are estimated at 1,500,000, the great mass of whom adhere to the religion of the Greek church; but there are many tribes of Tartars scattered throughout the province, who, like their ancestors, remain heathens. The whole province is undulating, with no elevations that are more than 400 feet above the level of the sea. The soil is generally sandy, but much of it is compounded of portions of clay and marl, and other earths, so that where cultivation is conducted with any degree of skill and attention, the produce is considerable. In corn the crops commonly yield one fourth more than the consumption requires. The chief grains are rye and buck-wheat; but there is much wheat grown, and the increase on appropriate soils is said to be tenfold the seed. A great quantity both of hemp and flax is raised, and all the common garden vegetables and fruits. The woods extend along the banks of the great rivers, and afford abundance of fuel, and of timber for the construction of houses and ships. The province is admirably watered, the chief river being the Wolga, which receives the waters of the Oka, the Kutma, the Kirsentz, the Sura, the Wetluga, and the Alaty, all of which are navigable to the main stream. It is a manufacturing district, producing abundance of matting, hempen and flaxen cloths, soap and candles, iron in bars and in common implements, leather, corn, spirits, and some glass. These, with live cattle, raw hides, and wood, form the principal articles of the export trade, which is chiefly carried on by the Wolga and its tributary streams. The city of Nishegorod, the capital, is 830 miles from St Petersburg, being in latitude 56. 19. 43. north, and in longitude 46. 23. 5. east. It stands at the

Nishapour
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Nishegorod.

Nisibin
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Nisroch.

junction of the Oka with the Wolga, in a picturesque situation, between hills; and it is the centre of the trade, as well as of the government of its province, and the seat of a Greek bishop. It contains 1826 houses, mostly of wood, and 12,300 inhabitants, who chiefly subsist by manufactures and trade, which connect them with the Persians, Siberians, Turks, and Tartars, who resort in great crowds, especially to a fair which lasts from the 29th of June to the end of July annually.

NISIBIN, a village of Persia, in the pachalik of Bagdad, which was in ancient times the celebrated fortress of Nisibis, and, from the time of Lucullus until the decline of the empire, was regarded by the Romans as the firmest bulwark of the East. This city was taken by Lucullus, from Tigranes, king of Armenia. It was three times besieged by the king of Persia, who, by the treaty of Dura, at last obtained quiet possession of the fortress, which had successfully resisted the utmost efforts of his arms. Nisibis, in the hands of the Persians, braved the attacks of successive emperors, and baffled the military talents of Belisarius; until at last, after the final overthrow of the house of Artaxerxes, it was reduced, along with the other cities of Mesopotamia, under the power of the Saracens. The foundations of the walls, and several detached towers, as well as part of the church built in honour of St James, who was formerly bishop of Nisibis, are still standing. They overlook the little but rapid river Mygdonius, and are approached by a small Roman bridge of twelve arches. To the west there is a view of the lofty mountains of Sinjar, covered with verdure; and the prospect to the north and east is bounded by the ridge of Mount Masius, forming a vast amphitheatre, at the extremity of which, in a clear day, may be descried the distant turrets of Merdin. The adjacent country has a pleasing appearance, the numberless villages which overspread the plains being built wholly on conical hills, bearing a striking resemblance to our feudal castles. Grecian and Roman coins, with other antiquities, are frequently dug out of the ruins. The black tents of the Kurds now cover the greater part of the city. Nisibin is seventy-eight miles south-east of Diarbekir, and seventy north-west of Mosul.

NISI PRIUS, in *Law*, a judicial writ which lies in cases where, the jury being impanelled and returned before the justices of the bank, one of the parties requests to have such a writ for the ease of the country, that the trial may take place before the justices in the same county on their coming thither. The purport of a writ of *nisi prius* is, that the sheriff is thereby commanded to bring to Westminster the men impanelled, at a certain day, before the justices, *nisi prius justiciarii domini regis ad assisas capiendas venerint*.

NISMES, an arrondissement of the department of the Gard, in France, 467 square miles in extent. It comprehends eleven cantons, divided into seventy-two communes, and contains 131,712 inhabitants. The capital is the city of the same name, which is situated in an extensive and fruitful plain, bounded by two parallel hills. It has a labyrinth of narrow and ill-built streets; but the suburbs are much more regular, and contain the best edifices, together with some open places, and pleasing promenades. Nismes contains many remains of antiquity, especially a Roman amphitheatre capable of seating 20,000 spectators. It has a cathedral, ten Catholic and five reformed churches, with, in the year 1836, 43,036 inhabitants, of whom about one eighth are Protestants. It contains an academy, with a library of 30,000 volumes. Its industry consists in the manufacture of silks, hosiery, cottons, lace, ribbons, and especially brandy. Nismes was the birthplace of the celebrated Protestant preacher Saurin, and of the poet Florian.

NISROCH, a god of the Assyrians. Sennacherib was killed by two of his sons whilst he was paying his adora-

VOL. XVI.

tions to the god Nisroch in his temple (2 Kings, xix. 37); but it is not known who this god Nisroch was. The Septuagint calls him Mesrach, and Josephus denominates him Araskes, while the Hebrew of Tobit, published by Munster, calls him Dagon. The Jews have a strange notion concerning this deity, whom they fancy to have been a plank of Noah's ark. Some think that the word signifies a dove; and others understand by it an eagle, which has given occasion to an opinion, that Belus, from whom the Assyrian kings pretended to be derived, was worshipped by them under the form of an eagle, and called Nisroch.

NITHSDALE, NITHISDALE, or *Niddisdale*, a district of Dumfriesshire, in Scotland, lying to the westward of Annandale. It is a large and mountainous tract, deriving its name from the river Nid or Nith, which rises on the borders of Ayrshire, and, running by Sanquhar and Dumfries, discharges itself into the Solway Frith.

NITOCRIS, the mother of Belshazzar, whose father was Evilmerodach, and his grandfather Nebuchadnezzar. She was a woman of extraordinary abilities, who took upon herself the burden of all public affairs, and, whilst her son followed his pleasures, did all that could be done by human prudence to sustain the tottering empire. She perfected the works which Nebuchadnezzar had begun for the defence of Babylon; raised strong fortifications on the side of the river; and caused a wonderful tunnel to be constructed under it, leading from the old to the new palace. She likewise built a bridge across the Euphrates, and accomplished several other works, which were afterwards ascribed to Nebuchadnezzar. Philostrates, in describing this bridge, tells us that it was built by a queen, who was a native of Media; and hence we may conclude that this illustrious princess was by birth a Mede.

NIVELLE DE LA CHAUSSEE (*Peter Claude*), a comic poet, was born in Paris, and acquired great reputation by inventing a new kind of entertainment, called the Weeping Comedy. Instead of imitating Aristophanes, Terence, Molière, and the other celebrated comic poets who had preceded him; and instead of exciting laughter by painting the different ridiculous characters, or giving strokes of humour and absurdities in conduct; he applied himself to represent the weaknesses of the heart, and to touch and soften it. In this manner he wrote five comedies: 1. *La Fausse Antipathie*; 2. *Le Préjugé à la Mode*; 3. *Melanie*; 4. *Amour pour Amour*; and, 5. *L'Ecole des Mères*. He was received into the French Academy in 1736, and died at Paris in 1754, at the age of sixty-three. He also wrote a tragedy entitled *Maximianus*; and an epistle to *Clio*, an ingenious didactic poem.

NIVELLES, a circle of the province of South Brabant, in the Netherlands, comprehending six cantons, divided into 115 communes, and containing 87,480 inhabitants. The chief place is the city of the same name situated on the river Thienne. It contains 750 houses, and 7000 inhabitants, whose chief employment consists in making lace, cambrics, and other linen goods, and in growing hemp, flax, and hops, in the surrounding fields. Long. 4. 10. E. Lat. 50. 35. N.

NIZAMPATAM, a town of the south of India, in the province of the Northern Circars. It is situated at the mouth of the Krishna River, forty miles west-south-west from Masulipatam. It carries on a considerable coasting trade. Long. 80. 35. E. Lat. 15. 56. N.

NIZZA DELLA PAGLIA, a city of the province of Aquis, in Piedmont, standing on the river Belbo, where the Nizza falls into it. It is a poor place, surrounded with walls, containing a few splendid houses, five monasteries, and 5156 inhabitants, who chiefly subsist by spinning silk and cultivating vineyards.

NO, or No-AMMON, a considerable city of Egypt, dedicated to Ammon or Jupiter. The Septuagint translate

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Nithsdale
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No.

Noacote
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Noah.

the name in Ezekiel, *Diospolis*, or the City of Jupiter. Borchart takes it to be *Thebes* in Egypt, which, according to Strabo and Ptolemy, was called *Diospolis*. Jerome, after the Chaldaic paraphrast Jonathan, supposes it to be Alexandria, named thus by way of anticipation; or an ancient city of that name which is supposed to have stood on the spot where Alexandria was afterwards built.

NOACOTE, an inconsiderable town of Northern Hindustan, situated in a fruitful valley of the same name. Though small, it contains some of the largest and best looking houses in Nepaul, also a celebrated Hindu temple dedicated to Bhavany. Its situation is of importance, as commanding the only entrance into this quarter from Upper as well as Lower Thibet, and standing close to Mount Dhyboon, by which the Chinese army was obliged to descend in 1792, when they invaded Nepaul. The valley of Noacote, in which the town is situated, is six miles in length by one mile and a quarter in breadth. Long. 85. 30. E. Lat. 27. 43. N.

NOAH, NOACH, or NOE, the son of Lamech, was born in the year of the world 1056. Amidst the general corruption into which all mankind had at this time fallen, Noah alone was found to be just and perfect in his generation, walking with God. This extraordinary person having therefore found favour in the sight of Heaven, the Almighty, seeing that all flesh had corrupted their ways, told Noah that he was resolved to destroy mankind from the face of the earth by a flood of waters; and not them alone, but all the beasts of the earth, and every creeping thing, as well as the fowls of the air. The Lord therefore directed Noah, as a means of preserving himself and his family (for he had three sons, Shem, Ham, and Japheth, who were all married before the Flood), to build an ark or vessel of a certain form and size fitted to that end, and which might besides accommodate such numbers of animals of all sorts, that were liable to perish in the Flood, as would be sufficient to preserve the several species, and again to replenish the earth.

In the year of the world 1656, being the six hundredth of his age, Noah, by God's appointment, entered the ark, together with his wife, his three sons, their wives, and all the animals which God had caused to come to him; and being all entered, and the door of the ark being shut down from the outside, the waters of the Deluge began to fall upon the earth, and increased in such a manner that they were fifteen cubits above the tops of the highest mountains, and continued thus upon the earth for 150 days; so that whatever had life upon the earth, or in the air, was destroyed, except such as were with Noah in the ark. But the Lord remembering Noah, sent a wind upon the earth, which caused the waters to subside; so that upon the seventeenth day of the seventh month the ark rested on the mountains of Ararat; and Noah having uncovered the roof of the ark, and observing that the earth was dry, he received orders from the Lord to come out of it, with all the animals that were therein. This he did in the six hundred and first year of his age, on the 27th day of the second month. See the article DELUGE.

Then Noah offered as a burnt sacrifice to the Lord one of all the pure animals that were in the ark; and the Lord accepted his sacrifice, and said to him that he would no more pour out his curse upon the whole earth, nor any more destroy all the animals, as he had now done. He gave Noah power over all the brute creation, and permitted him to eat of them, as well as of the herbs and fruits of the earth; excepting only the blood of animals, the use of which God did not allow him. He bade him increase and multiply, made a covenant with him, and engaged no more to send an universal deluge upon the earth; and as a memorial of his promise, he set his bow in the clouds, to be as a pledge of the covenant which he had made with Noah.

Noanagur
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Nob.

Noah, being an husbandman, began now to cultivate the vine; and having made wine and drank thereof, he unwarily became intoxicated, and falling asleep in his tent, happened to uncover himself in an indecent posture. Ham, the father of Canaan, having observed him in this condition, made sport with his father, and acquainted his two brothers, who were without, of the exposure of the patriarch. But they, instead of making it a matter of sport, turned away from it, and going backwards, they covered their father's nakedness, by throwing a mantle over him. Noah awaking, and knowing what Ham had done, said that Canaan the son of Ham should be accursed, that he should be a slave of slaves in respect of his brethren. It is thought he had a mind to spare the person of his son Ham, for fear the curse might light upon the other children of Ham, who had had no part in this action. He cursed Canaan by a spirit of prophecy, because the Canaanites, his descendants, were afterwards to be rooted out by the Israelites. Noah added, Let the Lord, the God of Shem, be blessed, and let Canaan be the servant of Shem. And he was so in effect, in the person of the Canaanites subdued by the Hebrews. Lastly, Noah said, Let God extend the possession of Japheth; let Japheth dwell in the tents of Shem, and let Canaan be his servant. This prophecy had its accomplishment, when the Grecians, and afterwards the Romans, being descended from Japheth, made a conquest of Asia, which formed the portion of Shem.

But Noah lived yet after the Deluge three hundred and fifty years; and the whole duration of his life having been nine hundred and fifty years, he died in the year of the world 2006. He left three sons, Shem, Ham, and Japheth, of whom mention is made under their several names; and, according to the common opinion, he divided the whole world amongst them, in order that it might be re-peopled. To Shem he gave Asia, to Ham Africa, and to Japheth Europe. Some will have it, that, besides these three sons, he had several others. The spurious Berosus assigns him thirty, called Titans, from the name of their mother. It is also pretended that the Teutons or Germans are derived from a son of Noah called Thuiscon. Methodius likewise mentions Jonithus or Jonicus, a pretended son of Noah.

St Peter calls Noah a preacher of righteousness, because before the Deluge he was incessantly preaching and declaring to men, not only by his discourses, but by his blameless life, and by the building of the ark, in which he was employed six score years, that the wrath of God was ready to descend upon them. But his preaching had no effect, since, when the Deluge came, it found mankind plunged in all their former enormities.

Several learned men have observed, that the Heathens confounded Saturn, Deucalion, Ogyges, the god Cœlus or Uranus, Janus, Proteus, Prometheus, and others, with Noah. The wife of Noah is called Noriah by the Gnostics; and the fable of Deucalion and his wife Pyrrha is manifestly a corruption of the history of Noah.

NOANAGUR, a very large town, and the capital of a district of the same name, surrounded by a stone wall of no great strength, with round towers and a ditch. It is situated on the river Nagne, which is supposed by the natives to possess some qualities peculiarly favourable for the dyeing of cloths, for which, as well as the manufacture thereof, this place is celebrated. The chief of Noanagur coins money in his own name. His subjects are addicted to piracy; but in the year 1808 he entered into a treaty with the British to refrain from this practice, and not to plunder any ships which might be driven on their coast by distress. Long. 70. 15. E. Lat. 22. 20. N.

NOB, a sacerdotal city of the tribe of Benjamin or Ephraim. St Jerome says, that in his time it was entirely destroyed, and that the ruins of it might be seen not far

Noba
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Nobility.

from Diospolis. When David was driven away by Saul, he went to Nob, and asking the high priest Ahimelech for some provisions and arms, the priest gave him the shewbread which had lately been taken off the holy table, and the sword of Goliath. Saul being informed of this by Doeg, caused all the priests of Nob to be slain, and the city to be destroyed. (1 Sam. xxi. xxii.)

NOBA, a small island in the Eastern Seas, near the western coast of Aroo. Long. 135. 13. E. Lat. 5. 5. S.

NOBAH, a city beyond Jordan, which took the name of Nobah from an Israelite of this name who had conquered it. Gideon pursued the Midianites as far as this city. Eusebius informs us, that there is a desolate place of this name about eight miles from Heshbon, towards the south; but this could not be the Nobah now mentioned, because the latter was much farther to the north.

NOBILIARY, a book containing the history of the noble families of a nation or province.

NOBILITY, in general, signifies dignity, grandeur, or greatness, but more particularly antiquity of family, joined with riches. In the common acceptation of the word, it means that quality or dignity which raises a man above the rank of a commoner.

Whether that equality of rank and condition which has sometimes been contended for would be more agreeable to the order of nature, or more conducive to the happiness and prosperity of mankind, may be made a question; but it is one, we apprehend, which cannot receive different answers from men capable of reflecting without prejudice and partiality. A state of perfect equality can subsist only amongst beings possessing equal talents and virtues; but such beings are not human. Were all mankind under the constant influence of the laws of virtue, a distinction of ranks would be unnecessary; but in that case civil government itself would likewise be unnecessary, because men would have attained all that perfection to which it is the object of civil government as well as of religion to guide them, and every man would then be a law unto himself. But whilst, in so many breasts, the selfish passions predominate over those which are social, violence must be restrained by authority; and there can be no authority without a distinction of ranks, such as may influence public opinion.

It is observed by Hume, that government is founded solely on opinion; and that this opinion is of two kinds, opinion of interest and opinion of right. When a people are persuaded that it is their interest to support the government under which they live, that government must necessarily be stable. But amongst the worthless and unthinking part of the community, this persuasion has seldom any place. All men, however, have a notion of rights—of a right to property, and a right to power; and when the majority of a nation considers a certain order of men as having a right to that eminence in which they are placed, this opinion, call it prejudice or what you will, contributes much to the peace and happiness of civil society.

“The distinction of rank and honours,” says Blackstone, “is necessary in every well-governed state, in order to reward such as are eminent for their services to the public, in a manner the most desirable to individuals, and yet without burden to the community; exciting thereby an ambitious yet laudable ardour, and generous emulation, in others. And emulation, or virtuous ambition, is a spring of action which, however dangerous or invidious in a mere republic or under a despotic sway, will certainly be attended with good effects under a free monarchy; where, without destroying its existence, its excesses may be continually restrained by that superior power from which all honour is derived. Such a spirit, when nationally diffused, gives life and vigour to the community; it sets all the wheels of government in motion, which, under a wise regu-

lator, may be directed to any beneficial purpose; and thereby every individual may be made subservient to the public good, while he principally means to promote his own particular views. A body of nobility is also more peculiarly necessary in our mixed and compounded constitution, in order to support the rights of both the crown and the people, by forming a barrier to withstand the encroachments of both. It creates and preserves that gradual scale of dignity which proceeds from the peasant to the prince; rising like a pyramid from a broad foundation, and diminishing to a point as it rises. It is this ascending and contracting proportion that adds stability to any government; for when the departure is sudden from one extreme to another, we may pronounce that state to be precarious.”

The origin of nobility in Europe is a subject involved in considerable obscurity. In this place we shall only consider the manner in which nobility may be created in this country, with the incidents attending it.

1. The right of peerage seems to have been originally territorial, that is, annexed to lands, honours, castles, manors, and the like, the proprietors and possessors of which were, in right of those estates, allowed to be peers of the realm, and were summoned to parliament to do suit and service to their sovereign; and, when the land was alienated, the dignity passed along with it as an appendage. Thus in England the bishops still sit in the House of Lords in right of succession to certain ancient baronies annexed, or supposed to be annexed, to their episcopal lands; and thus in 11 Henry VI. the possession of the castle of Arundel was adjudged to confer an earldom on its possessor. But afterwards, when alienations became frequent, the dignity of the peerage was confined to the lineage of the party ennobled, and, instead of territorial, became personal. Actual proof of a tenure by barony became no longer necessary to constitute a lord of parliament; but the record of the writ of summons to him or his ancestors was admitted as a sufficient evidence of the tenure.

Peers of Great Britain are now created either by writ or by patent; for those who claim by prescription must suppose either a writ or patent to have been issued or granted to their ancestors, though by length of time it has been lost. The creation by writ or the king's letter is a summons to attend the House of Peers, by the style and title of that barony which the king is pleased to confer; that by patent is a royal grant to a subject of any dignity and degree of peerage. The creation by writ is the more ancient way; but a man is not ennobled thereby, unless he actually take his seat in the House of Lords; and some are of opinion that there must be at least two writs of summons, and a sitting in two distinct parliaments, to establish a hereditary barony; and therefore the most usual, because the surest way, is to grant the dignity by patent, which endures to a man and his heirs according to the limitation thereof, although he himself should never make use of it. Yet it is frequent to call up the eldest son of a peer to the House of Lords by writ of summons, in the name of his father's barony, because in that case there is no danger of his children's losing the nobility in the event of his never taking his seat; for they will succeed to their grandfather. Creation by writ has also one advantage over that by patent. A person created by writ holds the dignity to himself and his heirs, without any words to that purport in the writ; but in letters-patent there must be words to direct the inheritance, otherwise the dignity endures only to the grantee for life. For a man or woman may be created noble for their own lives, and the dignity not descend to their heirs at all, or descend only to some particular heirs; as where a peerage is limited to a man and the heirs male of his body by Elizabeth his present lady, and not to such heirs by any former or future wife.

Nobility.

2. Let us next take a view of a few of the principal incidents attending the nobility, exclusive of their capacity as members of parliament, and as hereditary counsellors of the crown. And here it may be observed, that in criminal cases a nobleman must be tried by his peers. The great are always obnoxious to popular envy. Were they to be judged by the people, they might be in danger from the prejudices of their judges; and would moreover be deprived of the privilege of the meanest subjects, that of being tried by their equals, which is secured to all the realm by Magna Charta (c. 29). It is said that this does not extend to bishops, who, though they are lords of parliament, and sit there by virtue of the baronies which they hold *jure ecclesiæ*, yet are not ennobled in blood, and consequently not peers with the nobility. As to peeresses, no provision was made for their trial when accused of treason or felony, till after Eleanor duchess of Gloucester, wife to the lord protector, had been accused of treason, and found guilty of witchcraft, in an ecclesiastical synod, through the intrigues of Cardinal Beaufort. This very extraordinary trial gave occasion to a special statute (20 Hen. II. c. 9), which enacted, that peeresses, either in their own right or by marriage, should be tried before the same judicators as peers of the realm. If a woman, noble in her own right, marries a commoner, she still remains noble, and must be tried by her peers; but if she be only noble by marriage, then by a second marriage with a commoner she loses her dignity; for as by marriage it is gained, so by marriage it is also lost. Yet if a duchess-dowager marries a baron, she continues a duchess still; for all the nobility are *pares*, and therefore it is no degradation. A peer, or peeress, either in her own right or by marriage, cannot be arrested in civil cases; and they have likewise many peculiar privileges annexed to their peerage in the course of judicial proceedings. A peer sitting in judgment gives not his verdict upon oath, like an ordinary juryman, but upon his honour; he answers also to bills in chancery upon his honour, and not upon his oath; but when he is examined as a witness either in civil or criminal cases, he must be sworn; for the respect which the law shows to the honour of a peer does not extend so far as to overturn a settled maxim, that *in judicio non creditur nisi juratis*. The honour of peers is however so highly tendered by the law, that it is much more penal to spread false reports concerning them, and certain other great officers of the realm, than concerning other men; scandal against them being called by the peculiar name of *scandalum magnatum*, and subjected to peculiar punishment by different ancient statutes.

A peer cannot lose his nobility except by death or attainder, although there was an instance, in the reign of Edward IV., of the degradation of George Neville, duke of Bedford, by act of parliament, on account of his poverty, which rendered him unable to support his dignity. But this is a singular instance, which, by having happened, serves to show the power of parliament; and, by having happened only once, proves how tender the parliament has been in exerting so high a power. It has been said, indeed, that if a baron waste his estate, so that he be not able to support the degree, the king may degrade him; but it is expressly held by later authorities, that a peer cannot be degraded except by act of parliament.

Matthæus observes, that nobility amongst the Romans was quite a different thing from what it is amongst us. The nobles, amongst the Romans, were either those raised to the magistracy, or descended from magistrates; there was no such thing as nobility by patent.

Bartoli states, that doctors, after they have held a professor's chair in an university for twenty years, become noble, and are entitled to all the rights of counts. But this claim is not admitted at court; though Bartoli's sentiments be backed by those of several other authors, particularly

Chassanæus in his *Consuetudines Burgundiæ*, Boyer *sur la Coutume de Berry*, and Faber *C. de Dig. Def. 9*. The last, however, restrains Bartoli's rule to doctors in law, and princes' physicians.

NOBLE, *Nobilis*, a person who has any privilege which raises him above a commoner or peasant, either by birth, by office, or by patent from his prince. The word comes from the Latin *nobilis*, formed from the ancient *noscibilis*, distinguishable or remarkable.

In England the word *noble* is of a narrower import than in other countries, being confined to persons above the degree of knights; whereas abroad it comprehends not only knights, but what we simply call *gentlemen*. The nobles of England are also called *pares regni*, as being *nobilitatis pares*, though *gradu impares*.

NOBLES, amongst the Romans, were such as had the *jus imaginum*, or the right of using the pictures or statues of their ancestors; a right which was allowed only to those whose ancestors had borne some curule office, that is, had been curule ædile, censor, prætor, or consul. For a long time none but the *patricii* were the *nobiles*, because no person except those holding that superior rank could bear any curule office; and hence in Livy, Sallust, and other authors, the word *nobilitas* is used to signify the patrician order, and is hence opposed to *plebs*. To render the true meaning of *nobiles* still clearer, let it be observed, that the Roman people were divided into *nobiles*, *novi*, and *ignobiles*. The *nobiles* were those who had the pictures or statues of their ancestors; the *novi* were such as had only their own; and the *ignobiles* were such as had neither. The Roman nobility, by way of distinction, wore a half moon upon their shoes, especially those of patrician rank.

The nobility of Greece were called *Ευπατριδαι*, as being descended from those old heroic ancestors so famous in history. Such were the *Praxiærgidæ*, *Etrobutidæ*, *Alcæmonidæ*, and others, all of whom had many privileges annexed to their quality, and, amongst the rest, that they wore grasshoppers in their hair as a badge of nobility.

NOBLE, a money of account, containing six shillings and eightpence. The noble was anciently a real coin struck in the reign of Edward III., and then called the *penny of gold*; but it was afterwards called a *rose-noble*, from its being stamped with a rose. It was current at six shillings and eightpence.

NOCERA DE PAGANI, a city of the kingdom of Naples, in the province Principato Citeriore. It stands at the foot of a hill near the river Sarno, and is the see of a bishop, containing a cathedral, several parish churches and monasteries, with 6790 inhabitants.

NOCTAMBULI, NOCTAMBULONES, or *Night-walkers*, a term of equal import with *somnambuli*, applied to persons who have a habit of rising and walking about in their sleep. The word is compounded of the Latin *nox*, night, and *ambulo*, I walk. See SOMNAMBULA.

NOCTILUCA, a species of phosphorus, so called because it shines in the dark without any light being thrown upon it.

NOCTURNAL, something relating to the night, in contradistinction to diurnal.

NOCTURNAL, *Nocturlabium*, an instrument chiefly used at sea, in order to take the altitude or depression of some stars about the pole, and thereby to find the latitude and hour of the night. Some nocturnals are hemispheres or planispheres, on the plane of the equinoctial. Those commonly used amongst seamen are two; the one adapted to the polar star, and the first of the guards of the Little Bear; the other to the pole star, and the pointers of the Great Bear.

This instrument consists of two circular plates applied to each other. The greater, which has a handle to hold the instrument by, is about two inches and a half in diame-

Nod
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Noetians.

ter, and is divided into twelve parts, agreeing to the twelve months; and each month is subdivided into every fifth day, so that the middle of the handle corresponds to that day of the year in which the star observed has the same right ascension with the sun. If the instrument be fitted for two stars, the handle is made moveable. The upper left circle is divided into twenty-four equal parts for the twenty-four hours of the day, and each hour is subdivided into quarters. These twenty-four hours are noted by twenty-four teeth to be told in the night. Those at the hour of twelve are distinguished by their length. In the centre of the two circular plates is adjusted a long index, moveable upon the upper plate; and the three pieces, viz. the two circles and index, are joined by a rivet which is pierced in the centre with a hole, through which the star is to be observed.

To use the nocturnal, turn the upper plate till the long tooth marked twelve be against the day of the month upon the under plate; then, bringing the instrument near the eye, suspend it by the handle with the plane nearly parallel to the equinoctial, and viewing the pole star through the hole of the centre, turn the index about, till, by the edge coming from the centre, you see the bright star or guard of the Little Bear (if the instrument be fitted to that star); then the tooth of the upper circle, under the edge of the index, is at the hour of the night on the edge of the hour circle, which may be known without a light, by counting the teeth from the longest, which is for the hour twelve.

NOD, or the *Land of Nod*. It was to this country that Cain withdrew after the murder of his brother. The Septuagint, as well as Josephus, read *Naid* instead of *Nod*, and have taken it for the name of a place. It is not easy to ascertain what country this was, unless perhaps it was the country of Nyse or Nysea, towards Hyrcania. St Jerome and the Chaldaic interpreters have taken the word Nod in the sense of an appellative for vagabond or fugitive; "He dwelt a fugitive in the land."

NODATED HYPERBOLA, a name given by Sir Isaac Newton to a kind of hyperbola, which by turning round, decussates or crosses itself.

NODES, in *Astronomy*, the two points where the orbit of a planet intersects the ecliptic. See ASTRONOMY.

NODUS, or NODE, in *Dialling*, a certain point or pole in the gnomon of a dial, by the shadow or light of which either the hour of the day in dials without furniture, or the parallels of the sun's declination, and his place in the ecliptic in dials with furniture, are shown. See DIALLING.

NOESA BARON, an island in the Eastern Seas, near the south coast of Java, about twenty-five miles in circumference. Long. 113. 20. E. Lat. 8. 20. S.

NOESA CAMBAZ, or PULO CANNIBAZ, an island in the Eastern Seas, near the southern coast of Java, about forty-five miles in circumference. Long. 109. E. Lat. 7. 42. S.

NOESA LAOER, a small island in the Eastern Seas, near the southern coast of Ceram. Long. 129. 0. E. Lat. 3. 34. S.

NOESA NESSING, a small island in the Eastern Seas, near the northern coast of Timor. Long. 126. 30. E. Lat. 8. 9. S.

NOETIANS, in *Ecclesiastical History*, Christian heretics in the third century, followers of Noetius, a philosopher of Ephesus, who pretended that he was another Moses sent by God, and that his brother was a new Aaron. His heresy consisted in affirming that there is but one person in the Godhead; that the Word and the Holy Spirit were but external denominations given to God in consequence of different operations; and that, as Creator, he is called *Father*, as Incarnate, *Son*, and as descending on the apostles, *Holy Ghost*.

NOGARCOTE, a town of Northern Hindustan, in the kingdom of Nepaul. It is now tributary to the Chinese, by whom it was taken in 1792. It is sixty miles east from Catamandoo. Long. 86. 5. E. Lat. 28. 2. N.

Nogarcote
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Nollekens.

NOGENT LE ROTROU, an arrondissement of the department of the Eure and Loire, in France. It extends over 270 square miles, is divided into four cantons and fifty-nine communes, and contains 45,529 inhabitants. The capital is the city of the same name, situated on the river Huine, which here unites with the Arcisse, and both form a remarkable cascade. It is a well-built place, in a fruitful district, and in the year 1836 contained 6861 inhabitants, who were employed in weaving linens and serges. Long. 0. 37. E. Lat. 48. 20. N.

NOGENT SUR SEINE, an arrondissement in the department of the Aube, in France. It is 321 square miles in extent, contains 33,856 inhabitants, and is divided into four cantons, which are subdivided into eighty-five communes. The capital is the city of the same name, situated on the left bank of the Seine. It contains 750 houses, and 3355 inhabitants, who make some cotton goods and hosiery, but whose chief trade consists in sending wood to Paris. Long. 3. 55. E. Lat. 48. 5. N.

NOIRMOUTIER, an island belonging to the department of La Vendée, and arrondissement of Les Sables d'Olonne, in France. It forms a canton, and is on the western side of the island of Bouin. It is about fifteen miles in length, and about four in breadth. Its situation is low, and, to prevent the sea from overflowing it, it is surrounded with powerful dikes. The soil is very rich within the enclosure, and produces heavy crops of corn. Beyond the dikes are marshes, which afford abundance of salt formed by natural evaporation. The inhabitants are 7011, and many of them expert seamen, occupied in the fisheries. The chief town gives its name to the island; it contains 1600 inhabitants, and has a harbour capable of admitting vessels of fifty or sixty tons. Long. 2. 21. W. Lat. 47. 1. N.

NOJA, a city on a river of the same name, in the province of Basilicata, in the kingdom of Naples. It suffered a loss of one fourth of its population in 1816, from an epidemic disease. The inhabitants now amount to 5400, who cultivate much cotton.

NOLA, a city of the kingdom of Naples, in the province of Terra di Lavoro. It is the site of an ancient Roman city, buried under the effects of an eruption of Mount Vesuvius, and is altogether a gloomy place, with a cathedral and thirteen other churches, containing 8950 inhabitants.

NOLLE PROSEQUI is where a plaintiff in an action does not declare in a reasonable time, in which case it is usual for the defendant's attorney to enter a rule for the plaintiff to declare, after which a *non prosequitur* may be entered. A *nolle prosequi* is esteemed a voluntary confession that the plaintiff has no cause of action; and therefore if a plaintiff enters his *nolle prosequi*, he may be amerced; but if an informer cause the same to be entered, the defendant may have costs.

NOLLEKENS, JOSEPH, a distinguished English sculptor, was born at London, on the 11th of August 1737. His father, a native of Antwerp, was a painter by profession, and is mentioned by Horace Walpole, under the name of Old Nollekens, as an artist of some repute. He died whilst Joseph was still very young, and his widow having married again soon after his decease, the education of the youthful sculptor was much neglected. In his thirteenth year we find him in the studio of Scheemakers, where he exhibited his passion for his art by drawing and modelling early and late with the utmost assiduity. As his powers expanded, he became a candidate for the prizes offered to rising genius by the Society of Arts, which in the year 1759 gave him a premium of fifteen guineas for a group of figures in clay; in 1760 they presented him with thirty

Nollekens. guineas for a bas-relief, and during the same year they gave him ten guineas more for a model in clay of a dancing faun. He now began to attract considerable notice, as much on account of his quiet, mild, inoffensive appearance, as from the unquestionable cleverness of his productions; and Garrick, proverbially an observer of character, set down Joseph as a rising man of genius. No artist was ever greeted with even the comparatively limited applause which the works of this young sculptor elicited, without longing to visit those miracles of genius which are treasured in the land where art, like one of the native deities, sprang forth at once; nor was Nollekens an exception to the rule. In his twenty-third year, we find him in Rome, friendless, and nearly reduced to want, but enthusiastically pursuing his vocation. He modelled and carved in stone a bas-relief which brought him ten guineas in England; and in the following year, his group of Timoclea before Alexander, in marble, was honoured by the Society of Arts with a premium of fifty guineas. This success placed him above absolute dependence; and he was now noticed by the artists in Rome, particularly Barry, and also by some English visitors, amongst whom were Garrick and Sterne. The great English actor recognised him one day in the Vatican, invited him to breakfast next morning, and ended by sitting to him for his bust, for the model of which Garrick paid twelve guineas to the artist. Sterne likewise sat to him at Rome; and the bust of the wit, which is in terracotta, is considered as an admirable likeness. To the last hour of his life Nollekens alluded to it with pleasure. "Dance," he used to say, "made my picture with my hand leaning on Sterne's head; he was right."

But Nollekens, if he did not discover, profited by other means of enriching himself, which were less laborious than cutting out beautiful forms from the marble. In 1761, fragments of antique sculpture were more frequently to be met with in Rome and its vicinity; and legs, arms, heads, and other members of the body, strewed about like wrecks, when collected and put together with skill, were sold at very considerable prices. Joseph being sprung of a race of picture-makers and sellers, his spirit for bargaining was probably never surpassed; and this, with his proficiency as a sculptor, enabled him not only to collect the best fragments at the most reasonable prices, but to supply deficiencies, and put them together to the greatest advantage. That this proved a most successful speculation, the following anecdote, amongst many of the same kind which might be related, will sufficiently show. A loose head of Minerva, which even Englishmen would not purchase, lay on the shelf of a regular dealer in such articles, where it attracted the attention of Nollekens. It happened that the body of the same, or some other heathen goddess, was brought to light, and purchased by him for fifty guineas. A consultation was held with his brother dealer; the head and trunk were found of similar proportions, and the sculptor undertook to unite them as neatly as if they had both been chiseled from the same block of marble. This he accomplished, and Minerva stood forth restored. "It was sold," says his biographer and executor, Mr Smith, "for the enormous sum of one thousand guineas, and is now at Newby, in Yorkshire." A few speculations equally profitable would soon have raised the artist to affluence. He was, besides, liberally patronised by his countrymen who annually migrated to the capital of Italy, and for whom he executed many considerable works in marble, of which Mercury and Venus chiding Cupid are considered as the best. For all his productions he received immediate and liberal payment. Early misfortunes had made Nollekens acquainted with privation. Being an economist from necessity, he became frugal from habit; and this continued to influence his conduct when the necessity for parsimony no longer existed. He lived at Rome in a

very humble manner, and after ten years of profitable study, Nollekens. he returned to London comparatively rich.

Nollekens was now prepared to commence business upon his own account, and accordingly he took a lease of extensive premises in Mortimer Street. The busts of Sterne and Garrick had spread his fame in his native country, and he no sooner opened his doors than orders came in abundance. In 1771 he was admitted an associate of the Royal Academy, and in the following year was elected a member, much to the satisfaction of George III., who soon afterwards honoured the artist by sitting for his bust. The history of a man of genius is that of his works; and the few events which diversify his career, besides the successive appearance of his productions, serve but little to relieve its characteristic monotony. Amongst these the choice of a partner for life is probably the most important. Nollekens was not unfortunate in this respect. The lady of his choice was the friend of Samuel Johnson, and, if report may in aught be credited, the great critic was not insensible to her charms. Mrs Nollekens was endowed with no small share of that parsimonious spirit which her husband is said to have been so abundantly gifted withal, and was quite of his opinion as to one material point, namely, that the accumulation of wealth is not the least of our terrestrial pleasures. Nollekens was fully aware that his strength lay in busts; and as this line of art was an exceedingly profitable one, it may readily be supposed that his time and talents were principally devoted to it. Amongst his sitters were the great, the beautiful, and the titled of the land; and his profits were commensurate with the condition of his employers. He also found leisure to work out, slowly and with much care, marble groups and statues, amongst which may be mentioned those of Bacchus, Venus taking off her sandal, Hope leaning on an urn, Juno, Pætus and Arria, and Cupid and Psyche. His portraits were excellent, and there was generally a gentleness in the expression, and a gracefulness in the handling, which never failed to please. The likenesses of his busts were acknowledged by all, and the prettiness of the statues could not fail to be as generally admitted. But original vigour was wanting. He was one in whom the merely imitative faculty infinitely surpassed the imaginative. He could transfer to the marble, with the most perfect certainty and success, the features of a sitter; but he could not impart to the works of his hands that ideal beauty which etherealizes the subject, and is equal to the creation of a whole dynasty of gods and goddesses. As his strength lay in the sculpture of busts, so he pursued it with unparalleled success, and his studio became a fashionable lounge for those who reckoned their heads of sufficient importance to their friends or their country to have them modelled and cut in marble.

Towards his sitters, even the most exalted personages, he conducted himself with exceeding homeliness. Nollekens was all his life an unsophisticated child of nature, and his manners would no doubt appear very uncouth, perhaps vulgar, to that class of people who were accustomed to the dignified respect of Reynolds, or have since admired the courtly attentions of Lawrence. He had too much knowledge of human nature, however, not in his own blunt manner to employ flattery for the purpose of securing steadiness or a good position in the sitter.

The want of imagination Nollekens partially supplied by a diligent study of the antique; and hence, whilst every statue surpassed its predecessor in delicacy of workmanship, the artist only attained eminence by incessant labour. He was not one of those prodigies who reach their zenith as it were at the first flight. He was probably as little indebted to nature as most men who have attained greatness; but never-failing zeal for his profession, joined to unflinching industry, would have raised to distinction a less promising artist than Nollekens. During a period of ten years,

Nollekens. from 1776 to 1786, he exhibited sixteen busts, five statues, and four groups, some of which were not in marble. The statues were those of Juno, Diana, Adonis, Cupid, and Mercury, in which he followed the beaten track, without attempting any thing new. Amongst his monumental effigies may be mentioned that which commemorated the three commanders who fell in Rodney's great battle of the 12th April 1782. This being one of the government statues, the choice of the sculptor rested with the Royal Academy, and, after a fair competition, the design of Nollekens was that approved of. The monument is of large dimensions, and has a look of magnificence; but it is deficient in nature and sentiment, which can only be compensated to a limited extent by fine marble and fine workmanship. Another of his monumental works commemorates a lovely woman who died in childbed, and in it Religion is by her side holding up her finger to heaven. This production has always been greatly admired for the simplicity and beauty of the design, and for the skilful manner in which it is executed. The love of the nation for busts seemed to increase with the supply, and Nollekens found ample employment for his talents. Between 1786 and 1800, he sent some dozen of these to the exhibition; but during that period he is well known to have executed thrice as many more, his prices increasing with his fame, from one hundred to one hundred and fifty guineas. From his Venuses and other statues of that description, we pass on to those productions which were more suitable to the genius of the artist. The ten years which followed 1800 were the busiest in the life of Nollekens; for although he was between sixty and seventy years of age, he continued to work with the same diligence and skill as in his youth. Upwards of fifty busts proceeded from his chisel, besides nearly a score of groups and statues. Amongst the former were the far-famed heads of Pitt and Fox, those of the Prince of Wales, afterwards George IV., Dr Burney, the Marquis of Stafford, the Duke of Bedford, and others. Of the twenty statues and groups, the statue of Pitt for Cambridge attracted most attention at the time. The Venus anointing herself, however, was the favourite work of Nollekens, though it is deficient both in originality and in propriety of action. The workmanship of the statue, however, is very fine.

By temperance and perpetual equanimity of mind, Nollekens, although declined into the vale of years, still laboured as assiduously as ever. From 1810 till 1816, the last year of his exertions, he modelled some thirty busts, not a few of which are ranked amongst the most valuable of his works. The principal heads are those of the Duke of York, Lords Castlereagh, Aberdeen, Erskine, Egremont, Liverpool; Canning, Perceval, Benjamin West, and Thomas Coutts the banker. In 1817 Nollekens lost his wife, but being above eighty years of age, he was beyond that period of life when grief can be very acutely felt; and it is even hinted by some of his biographers, that his natural parsimoniousness, not being kept alive by the example of his still more penurious lady, assumed a milder form. He became in every respect more liberal, and presents to the needy members of his profession, with donations to benevolent institutions connected with art, were occurrences not so uncommon as formerly. For several years he lingered in that state of listlessness in which the mind shares the decay of the body, and dissolution, being preceded only by a gradual and almost imperceptible sinking of the vital powers, when it does take place, may be said to be felt rather than observed. Nollekens departed this life on the 23d of April 1823, leaving a fortune of some two hundred thousand pounds. This appears a vast sum indeed to have been accumulated by an artist; but several other distinguished ornaments of the profession have been even more liberally rewarded than he was, and have only left less because they were either less industrious or less economical.

With regard to the merits of Nollekens as an artist, little need be added to what has already been said. It was in bust sculpture that he most excelled; and here the chief attraction is ease and simplicity, whilst the chief defect is a want of dignity and sentiment. "There is little dignity," says his biographer, "but much truth; sometimes mechanic vigour, never exaggeration. It cannot be denied, however, that his vigour is often tame, his serenity languid; that his women are often beautiful without sentiment, and that in his men he is apt to miss that manly breadth of character which is the token of all that is great and noble." There is, however, some cant and affectation in all this. It is not the business of an artist to look into the soul or read the characters of men and women. He has to do only with material forms, and all that can be expected of him is to interpret faithfully, and fix permanently, that natural expression by which each individual is distinguished. Mr Nollekens, like Crabbe, was "nature's sternest painter, but her best." Adhering to strict truth, rather than dealing in sentiment, he did not feel himself at liberty to misinterpret the signs of natural expression according to the rank of his sitter, and give the intellectual grandeur of a forehead like Burke's to the features of Castlereagh because he was a lord, or to those of Mr Coutts because he was a banker and could afford to pay for it. (R. R. R.)

NOLLET, JEAN ANTOINE, regius professor of physics in the College of Navarre, and member of the Academy of Sciences at Paris, of the Royal Society of London, of the Institution of Bologna, and of the Academy of Sciences of Erfurt, was born at Pimbré, in the diocese of Noyon, on the 17th of November 1700. He was the son of respectable but not wealthy parents, who, to make up for the want of riches, determined to give their son a good education. They sent him to the College of Clermont in Beauvoisin, and afterwards to Beauvais, there to finish his introductory studies. The progress which he made in the different classes decided them to send him to study philosophy at Paris; and having intended him for the clerical order, they considered the strictness and purity of his morals, together with his unwearied application to study, as sufficient proofs of his vocation. The young Nollet yielded without reluctance to the wishes of his parents. As soon as he was capable of showing an inclination for any thing, he had discovered a taste for physics; but this had not become his ruling passion; and he therefore sacrificed it to the study of scholastic divinity, to which he wholly dedicated himself during the time of his probation in 1728. No sooner had he been invested with the deaconship, than he solicited and obtained a license to preach. This new occupation, however, did not make him entirely lose sight of those studies which had first engaged his attention, and insensibly began to occupy a greater portion of his time, which was now more equally divided between theology and the sciences. The latter, however, prevailed; and thenceforth he entered upon the study of physics with an ardour which was only increased by that kind of privation to which he had been long subject. He was received into the Society of Arts established at Paris under the patronage of the Count de Clermont. In 1730, the Abbé Nollet was engaged in a work in conjunction with Reaumur and Dufay of the Academy of Sciences. In 1734 he went to London in company with MM. Dufay, Duhamel, and Jussieu; and his merit procured him a place in the Royal Society without any solicitation. Two years afterwards, he went to Holland, where he formed an intimate connection with Desaguliers, s'Gravesande, and Muschenbroeck. On his return to Paris, he resumed the course of experimental physics which he had begun in 1735, and which he continued till 1760. These courses of physics first suggested the idea of giving particular courses in other branches of science, such as in chemistry, anatomy, and

Nollet.

Nomades natural history. In 1738, the Count de Maurepas prevailed on Cardinal Fleury to establish a public class for experimental physics; and the Abbé Nollet was appointed the first professor. In the beginning of the year 1739, he was admitted a member of the Royal Academy of Sciences; and in the month of April following, the king of Sardinia, intending to establish a professorship of physics at Turin, invited the Abbé Nollet to visit his dominions. In 1744, he was honoured with an invitation to Versailles, to instruct the dauphin in experimental philosophy; and the king and royal family were often present at his lectures. The young prince, until the period of his death, showed marks of the strongest attachment to this ingenious philosopher; and even prevailed upon him to go and pay court to a man in power whose patronage might be of service to him. The Abbé Nollet accordingly waited upon the place-man, and made him a present of his works. "I never read any works of that kind," said the patron coldly, at the same time casting a look at the volumes before him. "Sir," replied the Abbé, "will you allow them to remain in your antichamber? *There*, perhaps, there may be found men of genius who will read them with pleasure." In the month of April 1749, he made a tour in Italy, having been sent thither for the purpose of making observations. At Turin, Venice, and Bologna, the Abbé Nollet appeared as a deputy from the philosophers of the rest of Europe. During his short stay in Italy, the wonders of electricity were not the only object of his researches; every part of physics, the arts, and agriculture, came equally under his notice. Upon his return through Turin, the king of Sardinia, sensible of his merit, offered him the order of St Maurice, which, however, he did not think proper to accept without his sovereign's permission. In 1753 the king instituted a class of experimental philosophy in the Royal College of Navarre, and appointed the Abbé Nollet professor. In 1757 he received from the king a brevet appointing him preceptor in physics and natural history to the *Enfants de la France*. In the month of August the same year he was appointed professor of experimental philosophy in the school of artillery, which was at that time established at La Fère. In the month of November following, he was admitted as a pensionary of the Royal Academy of Sciences. M. de Cremillo, director-general of artillery and fortification, having founded a class of experimental philosophy at Mezières in 1761, the Abbé Nollet was appointed professor. This celebrated and laborious philosopher, who rendered the most important services to physics by the discoveries with which he has enriched every branch of this science, but particularly electricity, died at Paris on the 25th of April 1770, aged seventy. His works are, 1. Several Papers inserted in the Memoirs of the Academy of Sciences, amongst which one on the Hearing of Fishes is particularly valuable; 2. *Leçons de Physique Expérimentale*, in six vols. 12mo; 3. *Recueil de Lettres sur l'Electricité*, three vols. 12mo, 1753; 4. *Essai sur l'Electricité des Corps*, one vol. 12mo; 5. *Recherches sur les Causes particulières des Phénomènes Electriques*, one vol. 12mo; 6. *L'An des Expériences*, three vols. 12mo, 1770.

NOMADES, a name given in antiquity to several nations, whose whole occupation was to feed and tend their flocks, and who had no fixed place of abode, but were constantly shifting their ground, according to the conveniences of pasturage. The word comes from the Greek, *νομῶ, pasco*, I feed.

NOMARCHA, in *Antiquity*, the governor or commander of a nome or department. Egypt was anciently divided into several regions or departments, called *nomes*, from the Greek *νομός*, taken in the sense of a division; and the officer who had the administration of each nome from the king, was called *nomarcha*, from *νομός*, and *ἀρχή*, *command*.

NOMBRIL POINT, in *Heraldry*, is the next below the fess point, or the very centre of the escutcheon. Supposing the escutcheon to be divided into two equal parts below the fess, the first of these divisions is the nombril, and the lower the base.

NOME, or **NAME**, in *Algebra*, denotes any quantity with a sign prefixed or added to it, and by which it is connected with some other quantity, so that the whole becomes a binomial, trinomial, or the like.

NOMENCLATOR, in Roman antiquity, was usually a slave who attended upon persons who stood candidates for offices, and prompted or suggested to them the names of all the citizens they met, that they might court them and call them by their names, which amongst that people was the highest piece of civility.

NOMENCLATORS, amongst botanical authors, are those who have employed their labours about settling and adjusting the right names, synonymes, and etymologies of names, in regard to the whole vegetable world.

NOMENCLATURE, **NOMENCLATURA**, a catalogue of several of the more useful or radical words in any language, with their significations, compiled in order to facilitate the use of such words to those who are to learn the tongue, such as the Latin, Greek, French, and Italian nomenclatures: or it is a system of technical language, by which the objects of any science are denoted, as, for instance, the present language of chemical science, usually called the "new chemical nomenclature," from its recent construction.

NOMINALISTS, a sect of school philosophers, the disciples and followers of Occam, or Ockham, an English cordelier, who flourished in the fourteenth century. They received the denomination of *Nominalists*, because, in opposition to the *Realists*, they maintained that general terms, and not things or images, are the objects of the mind when engaged in abstract reasonings or inquiries.

This sect had its first rise towards the end of the eleventh century, and pretended to follow Porphyry and Aristotle; but it was not till Occam's time that they bore the name of Nominalists. The chief of this sect, in the eleventh century, was a person named John, who, on account of his logical subtilty, was called the sophist; and his principal disciples were Robert of Paris, Roscelin of Compiègne, and Arnoul of Laon. At the beginning the Nominalists had the upper hand; but the Realists, though greatly divided amongst themselves, were supported by men of eminent abilities, such as Albertus Magnus, Thomas Aquinas, and Duns Scotus. The Nominalist sect thus fell into disrepute, till Occam, in the fourteenth century, again revived it, and filled France and Germany with the flame of disputation. His followers having joined the party of the Franciscan monks, who strenuously opposed John XXII., that pope himself, and his successors after him, left no means untried to extirpate the philosophy of the Nominalists, which was deemed highly prejudicial to the interests of the church; and hence it was that, in the year 1339, the university of Paris, by a public edict, solemnly condemned and prohibited the philosophy of Occam, which was that of the Nominalists. The consequence was, that the Nominalists flourished more than ever. In the fifteenth century the controversy was continued with more vigour and animosity than before; and the disputants, not content with using merely the force of eloquence, had frequently recourse to more dangerous weapons, and battles were the consequence of a philosophical question which neither side understood. In most places, however, the Realists maintained a superiority over the Nominalists. Whilst the famous Gerson and the most eminent of his disciples were living, the Nominalists were in high esteem and credit in the university of Paris; but upon the death of these patrons, the face of things changed much to their disadvantage. In the year 1473, Louis XI., at the instigation of his confessor, the Bishop

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of Avranches, issued a severe edict against the doctrines of the Nominalists, and ordered all their writings to be seized and secured, that they might not be read by the people; but the same monarch mitigated this edict the year following, and permitted some of the books of that sect to be delivered from their confinement; and, in the year 1481, he not only granted a full liberty to the Nominalists and their writings, but also restored that philosophical sect to its former authority and lustre in the university.

The student of philosophy will do well to examine the researches of Brucker and the other historians of philosophy on the subject of Nominalism, and also to peruse what is to be found on the subject in the works of Mr Dugald Stewart and Dr Thomas Brown.

NOMINATIVE, in *Grammar*, the first case of nouns which are declinable. The simple position, or laying down of a noun, or name, is called the nominative case; yet it is not so properly a case, as the matter or ground whence the other cases are to be formed, by the several changes or inflections given to this first termination. Its chief use is in being placed in discourse before all verbs, as the subject of the proposition or affirmation.

NONA, a city of Dalmatia, now remarkable only for its ruins, but which are so buried by the repeated devastations to which that unhappy city has been exposed, that scarcely any vestige of them appears above ground. "I went thither," says Fortis in his Travels, "in hopes of finding something worthy of notice, but was disappointed. Nothing is to be seen that indicates the grandeur of the Roman times; neither are there any remains of barbarous magnificence to put one in mind of the ages in which the kings of the Croat Slavi had their residence there." It stands on a small island, surrounded by a harbour, which in former times was capable of receiving large ships, but is now become a fetid pool, by means of a little muddy river that falls into it, after a course of about six miles through the rich abandoned fields of that district. The ancient inhabitants turned this water into another channel, and made it run through the valley of Drasnich into the sea; and the remains of the bank raised by them for that purpose are still to be seen. But, notwithstanding the depopulation of this district, and the dreary situation of Nona in particular, the inhabitants have not lost courage, but, animated by the privileges granted to them, have endeavoured to bring the population and agriculture once more into a flourishing state. Proper drains for the water would not only render that rich territory habitable, but moreover very fertile; and the brackish marsh that surrounds the walls of Nona is well calculated to supply a considerable quantity of fish, especially eels. The government generously granted the investiture to private persons, who have derived no inconsiderable advantage from the fishing; and if they had adopted better methods, they might every year salt many thousands of eels, which would prove highly advantageous as an article of commerce, and save at least a part of the money that goes out of the country for foreign salt fish. To the left of the city of Nona appear the walls of some ancient ruinous buildings, which probably in ancient times were situated on the main land, though now surrounded by water. The sea forms a narrow channel in this place, which is easily fordable, and at low water the smallest boat can scarcely pass.

NONAGE, in *Law*, signifies generally all the time that a person continues under the age of twenty-one; but in a special sense, it is all the time that a person is under the age of fourteen.

NONAGESIMAL, or **NONAGESIMAL DEGREE**, called also the Mid Heaven, is the highest point, or ninetyeth degree of the ecliptic, reckoned from its intersection with the horizon at any time; and its altitude is equal to the angle which the ecliptic makes with the horizon at their intersection, or equal to the distance of the zenith from the

pole of the ecliptic. It is much used in the calculation of solar eclipses.

NONAGON, a figure having nine sides and angles. In a regular nonagon, or that the angles and sides of which are all equal, if each side be 1, its area will be $6.1818242 = \frac{9}{2}$ of the tangent of 70° to the radius 1.

NONCONFORMISTS, those who refuse to join the established worship. Nonconformists are in England held to be of two sorts. First, those who absent themselves from divine worship in the established church through total irreligion, and attend the service of no other persuasion. Secondly, those who offend through what churchmen call a mistaken or perverse zeal. By the English laws enacted since the time of the Reformation, Papists and Protestant dissenters were considered as conformists of this class, and both were supposed to be equally schismatics, in not communicating with the national church; with this difference, that the Papists divided from it upon material though erroneous reasons, but many of the dissenters upon matters of indifference, or, in other words, for what was thought no reason at all. "Yet certainly," as Sir William Blackstone observes, "our ancestors were mistaken in their plans of compulsion and intolerance. The sin of schism, as such, is by no means the object of temporal coercion and punishment. If, through weakness of intellect, through misdirected piety, through perverseness and acerbity of temper, or, which is often the case, through a prospect of secular advantage in herding with a party, men quarrel with the ecclesiastical establishment, the civil magistrate has nothing to do with it, unless their tenets and practice are such as threaten ruin or disturbance to the state. He is bound, indeed, to protect the established church; and if this can be better effected by admitting none but its genuine members to offices of trust and emolument, he is certainly at liberty so to do, the disposal of offices being matter of favour and discretion. But this point being once secured, all persecution for diversity of opinions, however ridiculous or absurd they may be, is contrary to every principle of sound policy and civil freedom. The names and subordination of the clergy, the posture of devotion, the materials and colour of the minister's garment, the joining in a known or unknown form of prayer, and other matters of the same kind, must be left to the option of every man's private judgment." See **TOLERATION**.

NON-NATURALS, in *Medicine*, are so called, because by their abuse they become the causes of diseases. Physicians have divided the non-naturals into six classes, namely, the air, meats and drinks, sleep and watching, motion and rest, the passions of the mind the retentions and excretions.

NON-OBSTANTÉ, *notwithstanding*, a clause frequent in statutes and letters-patent, importing a license from the king to do a thing which at common law might be lawfully done, but, being restrained by act of parliament, cannot be done without such license.

NON-SUIT signifies the dropping of a suit or action, or the renouncing thereof, by the plaintiff or defendant; which most commonly happens upon the discovery of some error in the plaintiff's proceedings when the cause is so far proceeded in that the jury are ready at the bar to deliver in their verdict.

NONES, *nonæ*, in the Roman calendar, the fifth day of the months of January, February, April, June, August, September, November, and December; and the seventh of March, May, July, and October. March, May, July, and October, had six days in their nones; because these alone, in the ancient constitution of the year by Numa, had thirty-one days each, the rest having only twenty-nine, and February thirty; but when Cæsar reformed the year, and made other months contain thirty-one days, he did not allot them six days of nones.

Nonagon
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Nones.

Nonjurors
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Noogoo.

NONJURORS, those who refused to take the oaths to government, and who were in consequence under certain incapacities, and liable to certain severe penalties. It can scarcely be said that there are now any nonjurors in the kingdom; and it is well known that all penalties have been removed both from Papists and Protestants, formerly of that denomination, as well in Scotland as in England. The members of the Episcopal church of Scotland were long denominated nonjurors; but they are now improperly called so, because the ground of their difference from the establishment is more on account of ecclesiastical than of political principles.

NONIUS, PETER, in Spanish *Nunez*, a learned Portuguese, and one of the most able mathematicians of the sixteenth century, was born at Alcacer. He was preceptor to Don Henry, son of Emmanuel, and taught mathematics in the university of Coimbra. He published the following works, by which he gained great reputation, viz. 1. *De Arte Navigandi*; 2. *Annotationes in Theorias Planetarum Purbachii*, which are greatly esteemed; 3. A treatise *De Crepusculis*; 4. A treatise on Algebra. It is observed in Furetière's Dictionary, that Peter Nonius, in 1530, first invented the angles of 45 degrees made in every meridian, and that he called them *rhumbs* in his language, and calculated them by spherical triangles. Nonius died in 1577, aged eighty.

NONIUS, the name given to the common device for subdividing the arcs of quadrants and other astronomical instruments, from the persuasion that it was invented by the above-named Nonius or Nunez. The generality of astronomers, however, transferring the honour of the invention from Nunez to Peter Vernier, a native of Franche Comté, have called this method of division by his name. But Mr Adams, in his Geometrical and Geographical Essays, has shown that Clevisius the Jesuit may dispute the invention with both of them. The truth seems to be, that Nunez started the idea, Clevisius improved it, and Vernier carried it to its present state of perfection. The method of Nunez, described in his treatise *De Crepusculis*, printed at Lisbon in 1542, consists in describing within the same quadrant 45 concentric circles, dividing the outermost into 90 equal parts, the next within into 89, the next into 88, &c. till the innermost was divided into 46 only. On a quadrant thus divided the plumb-line or index must cross one or other of the circles very near a point of division; and hence, by computation, the degrees and the minutes of the arch may be easily ascertained. This method is also described by Nunez in his treatise *De Arte atque Ratione Navigandi*, where he would fain persuade himself that it was not unknown to Ptolemy. But as the degrees are thus divided very unequally, and as it is very difficult to attain exactness in the division, especially when the numbers into which the arches are to be divided are in-composite, the method of diagonals, first published by Digges, in a treatise entitled *Alex seu Scala Mathematicæ*, printed at London in 1573, and said to be invented by one Richard Chenseler, was substituted in its stead. Nonius's method, however, was improved at different times and by different persons; and it must be acknowledged, that if Vernier saw either the original or any of the improvements (and there can be little doubt of his having seen them all), his merit consists only in having applied to an useful practical purpose the speculative invention of another person.

NONNUS, a Greek poet of the fifth century, and a native of Panopolis, in Egypt. He was the author of an heroic poem in forty-eight books, entitled *Dionysiacorum*, and a paraphrase in verse of St John's Gospel, which may serve as a commentary thereupon.

NOOGOO, one of the small Friendly Islands, three miles north-east from Tongataboo.

NOOGOONAMO, one of the Hapae Islands, a little to the south-east of Haano.

NOOHEVA, or **FEDERAL ISLAND**, one of the Ingraham Islands, in the Pacific Ocean. Long. 140. 5. W. Lat. 8. 58. S.

NOOLDROOG, the capital of a district of Hindustan, in the province of Bejapoor, situated between the 17th and 18th degrees of north latitude. Long. of the town 76. 37. E. Lat. 17. 42. N.

NOONTAL, a small and mountainous district of Northern Hindustan, in the province of Cashmere, situated about the 35th degree of north latitude.

NOOPORE, a town of Hindustan, in the province of Gujerat. Long. 73. 50. E. Lat. 21. 11. N.

NOORABAD, a town of Hindustan, in the province of Agra, situated on the Sank River, over which there is a bridge of seven arches, built of stone. Adjoining there is a large garden, laid out by Aurungzebe as a monument to the memory of Goona Begum, a princess of great personal and mental accomplishments. The shrine contains this Persian inscription: "Alas, alas, Goona Begum." Long. 78. 6. E. Lat. 26. 25. N.

NOORNAGUR, the capital of a district of the same name, in Bengal, situated at the foot of the Tipperah Mountains. Long. 91. 5. E. Lat. 23. 45. N.

NOORPEELY, a town of Hindustan, in the province of Orissa, twenty miles north of Jager.

NOORRI, a village of Hindustan, in the province of Sinde, situated on the banks of the Fulalee, fifteen miles below Hyderabad, between which city and the river there is a free intercourse. Lat. 25. 8. N.

NOOTKA, or **VANCOUVER'S ISLAND**, an island of New Georgia, on the western coast of North America. Black granite, mica, grit for grindstones, and hematites, are found there. In some places the vegetable earth forms a bed of two feet in thickness. The climate here is favourable to vegetation, being much milder than that of the eastern coast of America in the same latitude. Nootka Sound, situated in latitude 49. 35. north, and longitude 126. 36. west, was discovered by Captain Cook in 1778. The water in the sound is from forty-seven to ninety fathoms deep, and there are many anchoring places and good harbours. All the mainland opposite this island, comprising New Georgia, New Hanover, and New Albion, is claimed by the United States, and generally goes by the name of the Western Territory. See **WESTERN TERRITORY**.

NORD, a department of France, and, as its name denotes, the most northern of the kingdom. It has been formed out of French Flanders, French Hennegau, and the Cambresis, extending in north latitude from 49. 58. to 51. 5., and in east longitude from 2. 1. to 3. 9. Its surface is 2108 square miles, or 567,863 hectares, in extent. It is a level plain, with few elevations; and only one of them, the hill on which Cassel stands, attains the height of 400 feet above the level of the sea. The soil is generally moist and heavy, but, owing to good cultivation, is highly fertile, except on some sandy moors on the sea-shore near Dunkirk. According to the *Description Topographique et Statistique*, the land under the plough amounts to 326,430 hectares, the meadows to 138,428, the woodland to 62,129, the morass and other uncultivated fields to 15,000; and the remainder is occupied by rivers, roads, gardens, and the sites of cities, towns, and villages. In no other part of France is agriculture practised with so much skill and assiduity as in this department. The fields, by good ploughing and abundance of manure, yield crops constantly without fallowing; and corn is almost generally followed by green crops, which, especially the clover, is only to be matched in the province of Flanders, in the Netherlands. Abundance of wheat, winter and summer barley, oats,

Noogoo-
namo
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Nord.

Nord, Côtes du Nordbot- tens. and the several kinds of pulse, are produced; and although the land is not quite two English acres to each individual of the population, the produce is more than sufficient for their consumption, and much of it is exported.

The department is watered by numerous streams, the greater part of which are emptied into the Scheldt, which enters from the department of the Aisne, and, after a course of about forty-five miles, passes through the Netherlands to the sea. Some few of the rivers fall directly into the sea, and others reach it by the Sambre and the Meuse. There are several canals, used either for navigation or for the purpose of irrigation. The inhabitants of the department amounted in 1836 to 1,026,417, who, besides the employment connected with agriculture, are occupied in the fisheries, and in manufactures. The sea-fishing consists in the taking of herrings, cod, turbot, and others, and is extended also to the Greenland whale-fishery; whilst that on the rivers and canals furnishes a large portion of food. The chief manufacture is that of linen, including cambrics, damask table-linen, lawns, and thread-lace. This is said to employ 40,000 looms, and to furnish occupation for more than 160,000 persons in spinning. Some woollen and cotton goods are also made, as well as hats, hosiery, and leather. There are likewise many oil-mills, breweries, and distilleries of corn-spirits. The chief trade is carried on at Lush, but there are also extensive works at Douay, Cambrai, Dunkirk, and Valenciennes. This department belongs ecclesiastically to the bishopric of Cambrai. The chief court of law is held at Douay; and the department elects eight deputies to the legislative body. The religion is that of the Roman Catholic church, though there are a few Protestants, who support three chapels or churches for their worship.

NORD, Côtes du, a department of France, formed out of a part of the ancient province of Bretagne, and extending in north latitude from 48. 16. to 48. 56. and in west longitude from 2. 12. to 3. 49. It is bounded on the north by the sea, on the east by the department of Ille Vilaine, on the south by that of Morbihan, and on the west by Finisterre. It is 2494 square miles, or 672,096 hectares, in extent, and contains five arrondissements, forty-eight cantons, and 375 communes, with a population in 1836 of 605,563. It is a level plain, interspersed with a few gentle elevations. The shore is covered with rocks and small islands, and encircled by a belt of sandy soil, but intermixed with a few rich meadows near the rivers. The streams are all of but short course, and only navigable at the time of high tides. The climate is temperate, but moist and changeable. Agriculture is in a backward state, as is the civilization of the inhabitants, who speak for the most part a kind of Welsh, and live mostly in small villages or little farms; but, by subsisting chiefly on bread made of oats or buck-wheat, they furnish grain sufficient for their own consumption, and produce, besides, hemp and flax, which are converted into wearing apparel in their own houses, or made into sail-cloth and other articles. The fisheries give employment to some of the inhabitants; and iron mines, of which there are a few, furnish occupation to others. Much honey and bees' wax is obtained from the department. It sends four deputies to the legislative chamber.

NORDBOTTENS and WASTERBOTTENS, two provinces of the most northern part of Sweden, now formed into one, extending in north latitude from 63. 28. to 69. 20., and in east longitude from 15. 1. to 24. 2., and having an extent of 66,396 square miles. It is a mountainous country, interspersed with lakes. The winter lasts nine months, during which the surface is covered with snow; but in a few sheltered spots a little rye and barley, and some flax and hemp, may be cultivated. In the most northern part few trees grow, but in the south there are some birches and firs. The cows yield some butter; but the chief animals

are the rein-deer, which form a great article of food. The whole population is estimated at 75,000. There are no places in the province that can be considered as towns, though Tornea and Pithea are called so.

NORDEN, FREDERICK LOUIS, an ingenious traveller and naval officer in the Danish service, was born at Gluckstadt, in Holstein, in the year 1708. He was well skilled in the mathematics, ship-building, and especially in architecture; and in 1732 he obtained a pension to enable him to travel for the purpose of studying the construction of ships, particularly that of the galleys and other rowing vessels used in the Mediterranean. He spent nearly three years in Italy; but Christian VI. being desirous of obtaining a circumstantial account of Egypt, Mr Norden, whilst at Florence, received an order to extend his travels to that country. How he acquitted himself of this commission appears from his Travels into Egypt and Nubia, printed at Copenhagen in 1756, and which were soon afterwards translated into English by Dr Peter Templeman. In the war between England and Spain, Mr Norden, then a captain in the Danish navy, attended Count Ulric Adolphus to England, whence they went out as volunteers under Sir John Norris, and afterwards under Sir Chaloner Ogle. During his stay in London, Mr Norden was made a fellow of the Royal Society, and gave the public drawings of some ruins and colossal statues at Thebes, in Egypt, with an account of the same in a letter to the Royal Society, 1741. His health was at this time declining, and having repaired to France, he died at Paris in 1742.

NORDEN, a seaport town of the kingdom of Hanover, in the province of East Friesland, and the capital of the bailiwick of the same name. It stands at the mouth of the river Leysand, but the harbour is not good; and it contains 814 houses, with 4917 inhabitants. It is much resorted to in the summer as a sea-bathing place, and there are several distilleries and breweries, with some export of corn. Long. 7. 6. 1. E. Lat. 53. 35. 57. N.

NORDHAUSEN, a city, the capital of the circle of Holstein, in the Prussian province of Erfurt, on the river Zorge. It is an ancient town, surrounded with walls, and defended by several towers, and it contains one Catholic and seven Lutheran churches, with 1456 houses, and 9684 inhabitants, who are manufacturers of woollen cloths, especially flannels, lackered ware, leather, seed-oil, corn-spirits, nails, soap, and hats, besides many smaller articles. There is also a considerable trade in corn, cattle, wool, and bacon. Nordhausen contains a school of considerable celebrity, three hospitals, and an orphan-house. Long. 10. 43. 40. E. Lat. 51. 30. 22. N.

NORDLAND, a province in the most northern part of Norway, extending over 45,000 square miles, the whole of which, with a slight exception, is within the polar circle. It is divided into two bailiwicks, Nordland and Finmark, which together contained in 1801 a population of 78,425 persons; but, within the thirty-six years that have since elapsed, it is supposed to have somewhat increased. The climate forbids extensive agriculture, but some little barley is grown as high as the latitude of seventy degrees. The chief subsistence of the inhabitants depends on the fisheries and the chase; and the only articles of exportation are salted fish, furs, hides, and feathers, which are sent to Bergen in exchange for the few foreign commodities that are wanted.

NORDLINGEN, a city of Bavaria, in the circle of the Rezat, and the capital of the bailiwick of its own name. It stands on the river Eger, and is surrounded with walls, defended by towers and bastions, and with ditches. It contains 780 houses, and 6130 inhabitants, who make flannels, carpets, blankets, and other woollen goods, and have considerable trade in wool, corn, and leather. Long. 10. 23. 10. E. Lat. 48. 51. N.

NORES, JASON DE, a scholar, poet, and philosopher,

Norden
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Nores.

Norfolk. was born at Nicosia, in Cyprus. Having lost his fortune when the Turks made themselves masters of that island in 1570, he retired to Padua, where he acquired great reputation by teaching ethical philosophy. His character had that cast of severity which is often the consequence of scholastic habits. He was one of those men who discuss every thing without being capable of thoroughly understanding any thing. The *Pastor Fido* of Guarini made its appearance, and in consequence pastorals became a fashionable species of reading throughout all Italy. Nares, who did not relish works of this kind, attacked the production of Guarini, who entirely confuted him in a little piece printed at Ferrara in 1588. Nares made a reply two years afterwards; and the poet was preparing an answer still more severe than the former, when his antagonist died of grief, occasioned by the banishment of his only son for having killed a Venetian in single combat. He left behind him a great many works, some in Italian, and others in Latin. The principal of his Italian works are, 1. Poeticks, Padua, 1588, 4to; 2. A Treatise on Republics, 1578, 4to; 3. A Treatise on the World and its Parts, Venice, 1571, 8vo; 4. Introduction to three books of Aristotle's Rhetoric, Venice, 1548, 4to; 5. A Treatise on the aid which Comedy, Tragedy, and Epic Poetry, may receive from Moral Philosophy. His Latin works are, 1. Institutio in Philosophiam Ciceronis, Padua, 1576, 8vo; 2. Brevis et distincta Summa Præceptorum de Arte Discendi, ex libris Ciceronis collecta, Venice, 1553, 8vo; 3. De Constitutione partium Humanæ et Civilis Philosophiæ, 4to; 4. Interpretatio in Artem Poeticam Horatii. In all his works we remark great perspicuity and accuracy, profound erudition, and happy expressions, with a compact and sometimes forcible style.

NORFOLK, an English maritime county, bounded on the northern and north-eastern sides by the German Ocean, on the south and south-east by the county of Suffolk, and on the west by the counties of Lincoln and Cambridge. The shape is nearly that of an ellipsis bounded by a convex line, a little indented on the western extremity. Its greatest length is fifty-nine miles, and its greatest breadth thirty-eight. According to the most recent calculation, as made by Mr Rickman, the number of acres is 1,292,300.

The population, according to the returns at the four decennial enumerations, appears to have amounted in 1801 to 273,371, in 1811 to 291,999, in 1821 to 344,366, and in 1831 to 390,000. The annual value of the real property of the whole county, as taken for the property-tax in 1815, amounted to L.1,540,952.

The burials, including both the registered and the unregistered, in the ten years from 1821 to 1831, appear to have been one in fifty-two of the whole number of inhabitants then living. The illegitimate births were one in nineteen of the whole number born.

The occupations of the inhabitants, according to the returns arranged by Mr Rickman in 1831, were as follow:

Occupiers of land employing labourers.....	5,229
Occupiers of land not employing labourers.....	2,718
Labourers employed in agriculture.....	37,466
Employed in retail trades or handicraft.....	26,543
Capitalists, bankers, &c.....	3,116
Labourers not agricultural.....	6,577
Other males twenty years of age.....	93,498
Male servants.....	2,022
Female servants.....	14,490

The surface of this county presents less variety than almost any other in England. It is generally a level plain, with few undulations, and no bold or abrupt elevations. With the exception of some recently-planted districts around the seats of noblemen and gentlemen, the woody parts of the county are very inconsiderable; and there is general-

ly a great scarcity of the more umbrageous trees. The streams have almost all a languid and sombre appearance. Though, to the traveller of taste, the sameness and uniformity is wearisome, yet to him who directs his attention to the wealth and comforts of the districts through which he journeys, few countries can be more pleasing. The number and substantial appearance of the farm-houses, and even of the cottages, the condition of the roads and fences, and the high cultivation of the fields, are marks of rural prosperity that are nowhere more striking. Some few portions on the eastern side of the county form exceptions to this general description, but these are inconsiderable when compared with the whole.

From its exposure to the North Sea, the winters in Norfolk are usually severely cold, and the powers of vegetation are retarded to a later period of the year than in the western counties. In the hundred of Marshland the climate is not only cold, but damp; and the inhabitants are subject to intermitting fevers, which commonly attack all strangers who come to reside in that district. The soil of Norfolk is generally a light sand or sandy loam; for although a part of the fens are within the county, and the district of Marshland consists of ooze formed by deposition from the sea, as well as a narrow tract of land upon the banks of the river Waveney, yet these form but trifling exceptions to the general character of the soil of the county. Mr Arthur Young, in his Agricultural Survey of Norfolk, has made an attempt to classify the soils, and estimate their quantities. The difficulty of doing this with accuracy must be acknowledged by every one who considers the nice gradations which soils discover, and how various are their modifications. We give this estimate rather as an approximation to the truth than as absolutely exact.

Soils.	Square Miles.	Acres.
Light sand.....	220.....	140,800
Good sand.....	420.....	268,000
Marshland clay.....	60.....	38,400
Various loams.....	900.....	576,000
Rich loams.....	148.....	94,720
Peat.....	82.....	52,480

Since the land of Norfolk, from the representation here given, appears to be far from being naturally of a fertile description, the great amount of its productions must be attributed to the excellent system of agriculture which has been there introduced and extended, and which, though scarcely calculated for most of the other districts of our island, is admirably adapted for the soil and climate where it is pursued. The foundation upon which the whole system of its agriculture is built is the cultivation of turnips. These light soils are easily brought into a fine tilth by repeated ploughings and harrowings, and their produce maintains so large a portion of live stock, that their manure, when carefully preserved, and properly distributed, enriches the soil at every successive course more than it is impoverished by the crops of corn which are grown upon it. The land is thus in a constantly progressive state of improvement. The soil being so light, no deep ploughing is required, but such a repetition of moving it as will be sufficient to destroy the surface weeds, and to pulverize it effectually. This is easily effected by means of well-constructed light ploughs, drawn by two horses, which are guided by reins in the hands of the man who directs the plough. In many instances a four-course system of rotation is followed, consisting of turnips, barley, artificial grasses, and wheat. In some instances the artificial grasses are left two years in the ground, and then, after three or four ploughings, the wheat is sown. A very common rotation, provincially termed the six-course shift, is wheat, barley with or without clover, turnips, barley or oats, clover mown for hay, clover fed, and then wheat again. Both these systems, with the varieties of each, are founded upon the principle that as much

Norfolk. land shall be cultivated with green crops which furnish sustenance for cattle, and thereby produce manure, as is destined to the growth of corn. The system of drill-husbandry is carried to a great extent, and the practice of planting or dibbling grain of all kinds has been of late years very much and beneficially increased. By perseverance in these excellent plans, many extensive portions of the county of Norfolk, especially in the north-eastern part of it, which were a few years ago deemed incapable of producing a wheat crop, now yield abundant harvests of that grain. Oats are but a small object of cultivation; but barley is deemed the grain most appropriate to the soil and climate, and is consequently sowed to the greatest extent, occupying nearly one fourth of the arable land of the county. The increase of grain varies very considerably. On the heavy soils of Marshland and Flegg the produce of wheat is frequently six quarters, and of oats ten quarters, to the acre; but as these districts form but a small proportion of the whole, the average quantity of wheat in the county is about three quarters to the acre, and of barley four quarters. In no part of the kingdom have the various mechanical inventions for facilitating agricultural labour been so generally diffused as in Norfolk; and the implements used there may well serve as models for the other counties. Besides the common grains, wheat, barley, oats, pease, and beans, this county yields mustard, saffron, flax, and hemp; but none of them in such quantities as to merit especial notice.

The live stock of this county possess few peculiarly discriminative features. The horses, crossed by the breed of Suffolk, are bony, active, and hardy, and well adapted for husbandry or the road; and they are almost universally used for agricultural labour, to the exclusion of oxen. The native cows were a small breed, not unlike those of Alderney and Guernsey; but they have been improved by a mixture with the cows of the richer adjoining counties. The greater part of the cattle fattened in Norfolk are bought from the Scotch drovers, who bring them to the fairs about Michaelmas. They are fed upon the banks of the rivers on the natural grass, or upon the arable farms on turnips, till they become fit for slaughter. The number of Scotch cattle annually bought by the Norfolk farmers is estimated to vary from 15,000 to 20,000. The original sheep of Norfolk were a very hardy race, with horns, black feet, and black noses, the fleece yielding about two pounds of wool of third-rate fineness, and the quarters weighing, when fattened, about eighteen pounds. They were well calculated for the land when it was less highly cultivated than at present, as they were good travellers, and ate the herbage very close; but as the improved systems of husbandry have been extended, this native breed has sometimes been crossed by others, and in many instances has given place to the South Down sheep. The increase of arable farms has diminished the dairies, and consequently the pigs which were reared from them; and the practice of fattening hogs for bacon is scarcely known.

The poultry of Norfolk has been long celebrated, and vast quantities of it are conveyed to the London markets. The turkeys are most highly prized, from their superior delicacy of flavour. The dry nature of the soil is deemed peculiarly favourable to the rearing of these birds; and the numbers which are sent from Norfolk to other districts amount to hundreds of thousands. No part of England is so abundantly stocked with game, especially pheasants and partridges, as Norfolk. They are sedulously preserved by the landlords, and generally reserved in the leases, so that they have obtained the character of property, and are commonly respected as such by adjoining proprietors of estates. Great numbers of rabbits are bred on extensive warrens in many parts of the county, both for the sake of the flesh and of the wool.

Norfolk has long been and still continues to be an extensive manufacturing county. The Flemings first settled here as early as the year 1336, and made woollen goods at the village of Worstead; hence the name of that place was applied to the thread made of the longer kinds of wool. Under the persecutions of the Duke of Alva in Flanders, many more natives of that country found refuge in and near the city of Norwich. The fabrics have indeed successively changed with the change of fashions and the fluctuations of markets, but the manufactures have been continued through many vicissitudes to the present time. The chief goods now manufactured are bombazeens, camblets for the markets of China, and shawls of various and elegant kinds, principally for home consumption. This last article, introduced when the demand for stuffs from Spain ceased, has been highly beneficial to the city of Norwich and its vicinity. The introduction of machinery in the northern counties had destroyed the habit of spinning, which, a few years ago, universally prevailed amongst all the females of the peasants' families in this and the adjoining counties. Besides the manufactories of Norwich and its vicinity, some inferior kinds of bone-lace are made in Diss, and some other parts of the county; but the quantity produced is slowly and gradually diminishing.

Scarcely any of the goods manufactured in this county are sent directly to foreign markets, those destined for distant countries being almost wholly exported from London. The commerce is notwithstanding very extensive, from the two ports of Yarmouth and Lynn. Yarmouth, in regard to the number of its ships, is the eighth port in the kingdom, having more than 300 registered vessels. It is well situated for trade, and has one of the finest quays in Europe; but the depth of water is not sufficient for ships of great draft, and the bar at the mouth of the harbour is a serious impediment. The great support of the shipping of Yarmouth is the herring fishery. These fish are caught by the Yarmouth men, in the months of June and July, on the shores and in the lochs of Scotland, and at a later period on their own coasts. They are first cleaned, and then slightly salted; after which they are hung up in large appropriate houses, where, by the application of the smoke of wood fires, the preparation of curing them is completed. This fishery usually yields from 80,000 to 100,000 barrels of red herrings, each barrel containing about 1000 fish. This branch of industry, besides the employment of the seamen, gives occupation to several thousand artificers of various kinds. Besides this fishery, the exports of Yarmouth, as well as Lynn, and the smaller ports of Wells, Blackney, Burnham, and Clay, afford great employment to shipping, by the surplus quantity of corn which the county produces and sends to London and other ports. The imports at these towns consist of timber, hemp, wine, spirits, and foreign fruit; which, by means of the navigable rivers, are forwarded to the interior adjoining counties.

The rivers are sufficiently easy of navigation to render canals unnecessary, and there are consequently none in the county, though several have been commenced, and, after languishing some time, have been abandoned without being completed. The Great Ouse is a navigable river, which rises in Northamptonshire, enters this county at Downham, and empties itself into the sea near Lynn. It has a great rise of tide, and is navigable for barges twenty-four miles from its mouth, and for boats as far as Bedford; thus affording water communication with seven of the midland counties. The Little Ouse rises in the southern part of this county; at Thetford it receives the small river Thet, and from thence is navigable to its junction with the Great Ouse, on the borders of Cambridgeshire. The Waveney rises within nine or ten feet of the source of the Little Ouse, and takes a directly opposite course. It has many sinuosities, as its name denotes, becomes navigable at Bun-

Norfolk.

Norfolk. gay, receives the Yare at Burgh, and empties itself into the sea at Yarmouth. The Bure rises near Aylsham, and after joining the Thone near North Walsham, becomes navigable for boats. It falls into the Yare previously to its meeting the sea. The Yare rises near Attleburgh, becomes navigable at Norwich, and, after receiving the waters of the Tass and the Wensum, merges in the Wave-ney. Recently a communication directly from Norwich to the sea has been formed by a canal to Lowestoff. The Nar rises near Litcham, and has a short course to the sea at Lynn, whence it is navigable upwards to Narborough, a distance of fifteen miles.

The whole of the county is within the diocese of Norwich, the bishop of which see has his palace and cathedral in that city. The titles derived from the county are that of duke to the family of Howard; Earl of Norwich to the Scotch Duke of Gordon, and of Yarmouth to the Marquis of Hertford, Marquis and Viscount Townsend; Viscount Thetford to the Duke of Grafton; Barons Walsingham, Calthorpe, Wodehouse, Hobart, Walpole, and Nelson. Norfolk, under the reform act, was divided into two portions, each returning two members. The election for the eastern division is held at Swaffham, and the polling places are Downham, East Deerham, Fakenham, Lynn Regis, Swaffham, and Thetford. The election for the western division is held at Norwich, and the polling places are that city and the towns of Long Stratton, North Walsham, Reepham, and Yarmouth. Besides the four members for the county, the following places return two each, viz. Norwich, Yarmouth, Thetford, and Lynn Regis. Castle Rising, which before the change returned two members, has been disfranchised.

This county contains few Roman antiquities, but some of Saxon date are to be seen in the cathedral, the episcopal palace, the gates of Yarmouth and Lynn, and in several piles of ruins of ecclesiastical edifices, as well as in some of the parish churches. Amongst many distinguished natives of this county, the most celebrated have been Anne Boleyn, Dr Samuel Clarke, Sir Edward Coke, Archbishops Herring and Parker, Lord Nelson, Richard Porson, Sir Robert Walpole, and the Right Honourable William Windham.

In so large a county we may naturally expect to find many seats of noblemen and gentlemen. It would far exceed the limits which the nature of this work prescribes, to enumerate one half of them; but the most remarkable are the following:—Bickling, Lord Suffield; Binley Hall, Earl of Rosebery; Bracon Ash, T. F. Berney, Esq.; Buckenham House, Lord Petre; Costessey Hall, Sir William Jerningham; Felbrigg, Captain Lukin; Harling, Sir John Sebright; Hethel Hall, Sir Thomas Beevor; Hillington Park, Sir Martin Folkes; Houghton Hall, the Marquis of Cholmondeley; Intwood Hall, Earl of Buckinghamshire; Gunton, Lord Suffield; Kimberley Hall, Lord Wodehouse; Kirby Bedon, Sir John Berney; Melton Constable, Sir J. H. Astley; Quiddenham, Earl of Albemarle; Rainham Hall, Marquis of Townsend; Wareham, Sir M. B. Folkes; Wolterton Hall, Earl of Orford; Oxburgh Hall, Sir Richard Boddington.

The towns having a population exceeding 1500 inhabitants are the following:—

	Inhabited Houses.	Inhabitants.
Norwich.....	13,156	61,116
Yarmouth.....	4,570	21,115
Lynn.....	2,707	13,370
East Deerham.....	785	3,913
Wells.....	734	3,624
Thetford.....	675	3,462
Swaffham.....	626	3,285
Diss.....	559	2,934
North Walsham.....	560	2,615

	Inhabited Houses.	Inhabitants.
Aylsham.....	484	2,334
Downham.....	458	2,198
Upwall.....	390	2,123
Fakenham.....	383	2,077
Attleburgh.....	372	1,939
Shipdam.....	376	1,889
Harlestone.....	357	1,784
Holt.....	306	1,622
Hingham.....	308	1,539

Norfolk
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Norham.

NORFOLK, a borough-town and a port of entry in Norfolk county, Virginia, one of the United States of North America. It is situated on the north-eastern side of Elizabeth River, eight miles above its entrance into Hampton Road, and thirty-two miles from the sea. The land side of the town is not pleasant, being low, and in some places marshy. The streets are crooked and irregular, and neither the public nor the private buildings are remarkable for elegance. Of the former there are above twenty, including places of public worship for Episcopalians, Presbyterians, Baptists, Roman Catholics, and Methodists. The Farmer's Bank, the Orphan Asylum, and the Lancasterian School, are amongst the most conspicuous structures in Norfolk. It has a spacious and commodious harbour, nearly a mile in width, defended by three forts: Fort Norfolk on the north-east side of Elizabeth River, about a mile below the town; Fort Nelson on the south-west side of the river, a little higher than the former; and a large and strong fort upon Craney Island, five miles below the town. Norfolk has more shipping and maritime commerce than any other town in the state. On Washington Point, between the eastern and western branches of the river, there is a marine hospital, a handsome brick edifice. Near this town, also, there is an United States navy yard. The population of Norfolk amounted in 1820 to 8478, and in 1830 to 9816. Long. 76. 10. W. Lat. 36. 52. N.

NORFOLK ISLAND, in the Southern Pacific Ocean, is fifteen miles in circumference. It was discovered in 1774 by Captain Cook, who found it uninhabited. It has a remarkably fruitful soil; the whole country is clothed with verdure, and presents a scene of most exuberant fertility. It is described by Turnbull, who visited it in 1801, as being so uniformly fertile, that, with the exception of the mountains overhanging the sea, it would be difficult to find one spot less fertile than another. This island was colonized shortly after that of Port Jackson, by Governor Philips, who sent thither the more profligate division of the colonists; and the most abandoned convicts were afterwards sent to the same place. One great objection to the island as a colonial settlement is the difficulty of approaching it, in consequence of the mountainous sea which constantly beats on its rocky shores, so that ships from Port Jackson have often been obliged to beat off and on for upwards of a month, and found themselves still as distant as ever from all communication with the shore. This circumstance, and the want of any harbour or roadstead for shipping, is much against the island; and hence, in 1805, it was found necessary to remove the colonists and convicts either to Port Dalrymple or to the river Derwent. The population amounts to 1000. Long. 168. 10. E. Lat. 29. 3. S.

NORFOLK SOUND, according to the account of Captain Dixon, is situated in 57. 3. north latitude, and 135. 36. west longitude. It is a very extensive place, but how far it stretches to the northward is not known.

NORHAM, a township, the capital of the parish of the same name, in the district of Northumberland, county-palatine of Durham, pleasantly situated on the south side of the river Tweed, nine miles above Berwick. It is celebrated for being the frequent scene of forays during the wars between England and Scotland, probably because one of the principal fords across the Tweed between Berwick

Noria. and Kelso is only at a short distance above the village. Norham, in its present state, appears to have been built from the ruins of the celebrated castle situated at its eastern extremity. It has been much improved, and is now kept free from the filth which was formerly allowed to accumulate on its streets. The cross, which is at the west end of the village, also adds to its appearance. The church of Norham is of very old date, and has for its middle aisle part of the first church, which was built in the year 840. Before the Reformation, it had the privilege of affording sanctuary for thirty-seven days. There is also a Presbyterian meeting-house and an endowed school in the village. Its inhabitants are principally supported by salmon fisheries on the Tweed, shoe-making, and agricultural employment in the neighbourhood. In consequence of the dangerous state of the ford across the Tweed, and from the river being often impassable, sometimes even for the boats when it is much swollen with rain, arrangements have been made to erect a bridge across the river. The ruins of the castle are situated on a high rock which overhangs the river Tweed; they are of considerable extent, and consist of the remains of two sides of the tower or keep, many vaults, with the fragments of other edifices, and the remains of the outward walls, which enclose the castle to a considerable extent. There are also traces of field-works, which appear to have been erected by the forces which besieged it, in order to enable them to reduce it. The ruins have a most picturesque appearance. The inhabitants amounted in 1821 to 901, and in 1831 to 819.

NORIA, an hydraulic machine much used in Spain. It consists of a vertical wheel of twenty feet in diameter, on the circumference of which are fixed a number of little boxes or square buckets, for the purpose of raising the water out of the well, communicating with the canal below, and of emptying it into a reservoir above, which is placed by the side of the wheel. The buckets have a lateral orifice to receive and to discharge the water. The axis of this wheel is embraced by four small beams, which cross each other at right angles, tapering at the extremities, and thus form eight little arms. This wheel is near the centre of the horse walk, contiguous to the vertical axis, into the top of which the horse-beam is fixed; but near the bottom it is embraced by four little beams, forming eight arms similar to those above described, on the axis of the water-wheel. As the mule employed to turn it goes round, these horizontal arms, supplying the place of cogs, take hold, each in succession, of those arms which are fixed upon the axis of the water-wheel, and keep it in rotation.

This machine, than which nothing can well be cheaper, throws up a great quantity of water. Yet it has two serious defects. The first is, that part of the water runs out of the buckets and falls back into the well after it has been raised nearly to the level of the reservoir; and the second is, that a considerable proportion of the water to be discharged is raised higher than the reservoir, and falls into it only at the moment when the bucket is at the highest point of the circle, and ready to descend. But both these defects might be remedied with ease, by leaving the square buckets open at one end, making them swing upon a pivot fixed a little above their centre of gravity, and placing the trough of the reservoir in such a position as to stop their progress whilst perpendicular, make them turn upon their pivot, and so discharge their contents. From the reservoir the water is conveyed by channels to all parts of the garden. These have divisions and subdivisions in beds, some large, and others very small, separated from each other by little channels, into which a boy with his shovel or his hoe directs the water, first into the most distant trenches, and successively to all the rest, until all the beds and trenches have been either covered or filled with water. Mr Town-

send thinks, that on account of the extreme simplicity of this machine, it is an invention of the most remote antiquity. By means of it the inhabitants every morning draw as much water from the well as serves throughout the day, and in the evening distribute it to every quarter, according to the nature of their crops. The reservoirs into which they raise the water are about twenty, thirty, or even forty feet square, and three feet in height above the surface of the ground, with a stone cope on the wall, declining to the water, for the women to wash and beat their clothes upon.

NORICUM, a Roman province, situated between the Danube on the north, which separated it from ancient Germany; the Alpes Noricæ on the south; the river Ænus on the west, which separated it from Vindelicæ; and Mons Cetius on the east, which divided it from Pannonia. It now includes a great part of Austria, all Salzburg, Styria, and Carinthia. It was anciently a kingdom under its own sovereigns.

NORIS, HENRY, a cardinal, and a great ornament of the monastic order of St Augustin, was descended from the president Jason, or James de Noris, and was born at Verona in 1631. He was carefully educated by his father Alexander Noris, originally of Ireland, and well known by his history of Germany. From his infancy he discovered an excellent understanding, great vivacity, and quick apprehension. His father instructed him in the rudiments of grammar, and procured an able professor of Verona, called Massoleim, to act as his preceptor. At fifteen he was admitted as a boarder in the Jesuits' College at Rimini, where he studied philosophy; after which he applied himself to the writings of the fathers of the church, particularly those of St Augustin; and taking the habit in the convent of the Augustinian monks of Rimini, he in a short time distinguished himself amongst that fraternity by his erudition, insomuch that, as soon as he had completed his noviciate, the general of the order sent for him to Rome, to give him an opportunity of improving himself in the more solid branches of learning. Nor did he disappoint the expectations of his superior. He gave himself up entirely to his studies, and spent whole days, and even nights, in the library of the Angeliques of St Augustin. His constant course was to study fourteen hours a day; and this he continued till he became a cardinal. Thus he became qualified to instruct others, and was first sent to Pezaro, and thence to Perugia, where he took his degree of doctor of divinity; after which, proceeding to Padua, he applied himself to finish his History of Pelagianism. He began it at Rome at the age of twenty-six, and when he had completed his design, the book was printed at Florence, and published in 1673. In the following year the Grand Duke of Tuscany invited him to that city, made him his chaplain, and appointed him professor of ecclesiastical history in the university of Pisa, which his highness had recently founded.

In his history he explained and defended the condemnation pronounced, in the eighth general council, against Origen and Mopsuesta, the original authors of the Pelagian errors; and he also added an account of the schism of Aquileia, with a vindication of the books written by St Augustin against the Pelagians and Semi-Pelagians. The work procured the author great reputation, but called forth several antagonists, to whom he published proper answers. The dispute grew warm, and was carried before the sovereign tribunal of the Inquisition. There the history was examined with the utmost rigour, and the author dismissed without the least censure. It was reprinted twice afterwards, and the author was honoured by Pope Clement X. with the title of qualificator of the holy office. Notwithstanding this, the charge was renewed against the History, and it was delated afresh to the Inquisition in 1676; but it

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came again out of the trial with the same success as before. Mr Noris was now suffered to remain in peace for sixteen years, and taught ecclesiastical history at Pisa, without any molestation, until he was called to Rome by Innocent XII., who, in 1692, made him under-librarian of the Vatican. This post was a step to a cardinal's hat; his accusers, therefore, took fire afresh, and published several new pieces against him. Upon this the pope appointed some learned divines, who had taken neither side, to re-examine Father Noris's books, and report on them. Their testimony was so advantageous to the author, that his holiness made him counsellor of the Inquisition. Yet this did not prevent one of his adversaries, the most formidable on account of his erudition, from rising up against him, and attacking him warmly, under the assumed title of a Scrupulous Doctor of the Sorbonne. Noris tried to remove these scruples in a work which appeared in 1695, under the title of, *An Historical Dissertation concerning One of the Trinity that suffered in the Flesh*, in which, having justified the monks of Scythia, who had made use of that expression, he vindicated himself also from the imputation of having attained the Pope's infallibility, and abused Vincentius Lirinensis, and other bishops of Gaul, as favourers of Semi-Pelagianism, and as having themselves fallen into the errors of the Bishop of Ypres. But his answers to all these accusations were so much to the satisfaction of the pope, that at length, in 1695, his holiness honoured him with the purple.

After this he was in all the congregations, and employed in the most important affairs; so that he had little time to spend in study, a circumstance of which he frequently complained to his friends. Upon the death of Cardinal Casanati, he was made principal keeper of the Vatican Library in 1700, and two years afterwards he was nominated, amongst others, to reform the calendar; but he died at Rome, of a dropsy, in 1704. He was one of the most learned men of his time; his writings abound with erudition, and are also remarkable for their elegance. His works are numerous, and were published at Verona, in 1729 and 1730, in five volumes folio.

NORMANS, a fierce and warlike people of Norway, Denmark, and other parts of Scandinavia. They at different times overran and ravaged most countries in Europe, in the respective histories of which a full account of them will be found.

NORMAN Characters, a species of writing introduced into England by William I. From some old manuscripts, the Norman writing appears to have been composed of letters nearly Lombardic. In regal grants, charters, public instruments, and law proceedings, this character was used with very little variation from the reign of the Conqueror till that of Edward III.

NORRKOPING, a city of Sweden, in the province of Linköping. It stands on both sides of the river Motala, and is connected together by a bridge of boats. It is a moderately built town; one side of the river rising against the side of a hill, the other part being almost level with the water. The streets are wide and well paved, and there are some handsome squares, with a fine market-place. It contains three churches, one of which is for the Germans. There are several institutions for instruction and for charitable purposes. In 1834, it contained about 2000 houses and 10,500 inhabitants. It is the principal place of trade in the kingdom, next to Stockholm. It has some large fabrics of cutlery, and of all kinds of iron and copper ware. There are refineries for sugar and salt, some weavers of linen, cotton, and woollen goods, manufactories of soap and leather, and conveniences for building ships. The export trade consists of iron, steel, and copper in bars or in manufactured articles; in timber, pitch, tar, cordage, and sometimes salted fish. As the river is not more than twelve feet in depth, the larger ships are compelled to

take in and discharge their cargoes a little below the city. Long. 16. 5. 24. E. Lat. 58. 36. 5. N. Norrland
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NORRLAND, one of the provinces of Sweden, which extends in north latitude from 62. 28. to 64. 25. and in east longitude from 14. 41. to 15. 40. being 1078 square miles in extent. It is divided into three bailiwicks, and contains only two towns, with a great number of detached rural establishments. The number of inhabitants does not exceed 61,000. The capital is Hernösand, a city of 1850 inhabitants. In regard to prospects, it is one of the most picturesque in that romantic kingdom, presenting naked rocks rising to 1800 feet amongst lakes, rivers, and woods. The chief products, besides corn, which is scantily grown, are deals and tar, with some iron. The principal branch of industry is making linen, which is spun by both sexes during the long nights of winter.

NORTH, one of the four cardinal points of the world, being that point of the horizon which is directly opposite to the sun in meridian. The north wind is generally accompanied with a considerable degree of cold, and sometimes blows with almost irresistible fury. It is often mentioned by the classical authors under the name of *Boreas*, which is of Greek origin.

NORTH, Dudley, Lord, the third baron of that accomplished family. He was one of the finest gentlemen in the court of King James; but in supporting that character he dissipated and gambled away the greater part of his fortune. In 1645 he appears to have acted with the parliament; and by them he was appointed administrator of the admiralty, in conjunction with the Earls of Northumberland, Essex, Warwick, and others. He lived to the age of eighty-five; passed the latter part of his life in retirement; and wrote a small folio of miscellanies, in prose and verse, entitled a *Forest Promiscuous of several Seasons' Productions*, in four parts, 1659.

NORTH, Dudley, Lord, son of the preceding, was made knight of the Bath in 1616, when Charles was created Prince of Wales, and sat in many parliaments, till excluded by the prevailing party in the last, which condemned the king. From that period Lord North lived privately in the country, and towards the end of his life entertained himself with books, but, as his numerous issue required, with economy. He wrote a little tract, called *Observations and Advices Economical*, 12mo. His other works are, 1. *Passages relating to the Long Parliament*; 2. the *History of the Life of Lord Edward North*, the first baron of the family, addressed to his eldest son; and, 3. a volume of *Essays*.

NORTH, Francis, Lord Guildford, lord-keeper of the great seal in the reigns of Charles II. and James II. was a third son of the second Dudley Lord North, baron of Kertling, and studied at St John's College, Cambridge, whence he removed to the Middle Temple. He acquired French, Italian, Spanish, and Dutch, and became not only a good lawyer, but thoroughly conversant with history, mathematics, philosophy, and music. He was afterwards made the king's solicitor-general, and chosen to represent the borough of Lynn in parliament. He succeeded Sir He-neage Finch in the office of attorney-general; and Lord Chief Justice Vaughan, in that of lord chief justice of the Common Pleas. He was afterwards made keeper of the great seal, and in 1683 was created a baron by the title of Lord Guildford. He died at his house at Wroxton in the year 1685. Lord Guildford wrote a philosophical essay on music; a paper on the gravitation of fluids in the bladders of fishes, printed in Lowthorp's *Abridgement of the Philosophical Transactions*; and some other pieces.

NORTH, Frederick, Earl of Guildford, Lord North, lord warden and admiral of the Cinque Ports, governor of Dover Castle, lord lieutenant and custos rotulorum of Somersetshire, chancellor of the university of Oxford, recor-

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der of Gloucester and Taunton, an elder brother of the Trinity House, president of the Foundling Hospital and of the Asylum, a governor of the Turkey Company and of the Charter House, was born on the 13th of April 1732. On the 20th of May 1756, he married Miss Ann Speke, an heiress of the ancient family of Dillington in Somersetshire, by whom he left two sons and three daughters. His lordship succeeded the celebrated Charles Townsend as manager of the House of Commons and Chancellor of the Exchequer; and, in 1770, on the resignation of the Duke of Grafton, was made First Lord of the Treasury, in which office he continued until the close of the American war, or rather until the formation of the Rockingham ministry, which began the business of peace with the colonies. He was a man of strong mental faculties, and an orator of very considerable powers, enlivened and recommended by much pleasantry and amenity; but taking the helm at a time when the king's party were unpopular, and when it was supposed that the Earl of Bute was the great engine by which the cabinet was moved, he continued in a state of great unpopularity until he resigned the seals. During the whole of his premiership, he studiously avoided imposing any taxes which could materially affect the lower class of people. The luxuries and not the necessities of life were repeated objects of his budget. As a financier he stood high, even in the opinion of an opposition forming a combination of all the great talents in the kingdom; but being fatally wedded to the destructive plan of subduing the republican spirit of the Americans, his administration is marked by an immense waste of the public treasure, and a lavish expenditure of blood. The very last time he spoke in the senate, however, he defended that war, and said he was then, as he had formerly been, prepared to meet the minutest investigation as to his conduct in that contest, which nothing but the unforeseen intervention of France could have prevented from being crowned with success. His lordship was one of the firmest and most strenuous supporters of the constitution in church and state. He died on the 5th of August 1792.

NORTH CAPE, the most northerly promontory in Europe, situated on the coast of Norway. Long. 21. 0. E. Lat. 78. 0. N.

NORTH FORELAND, a cape or promontory of Kent, in the Isle of Thanet, four miles east of Margate. Between this and the South Foreland are the Downs, through which pass all ships bound to or from the west. Long. 1. 25. E. Lat. 51. 25. N.

NORTH ISLAND, a small island in the Eastern Seas, near the east entrance of the Straits of Sunda, where those who go ashore for wood or water are in great danger from the treacherous Malays, who surprise and murder them. Lat. 5. 57. S. There are four other islands of this name in the Eastern Seas, namely, one near the west coast of Borneo, longitude 109. 5. east, latitude 1. 22. south; another near the north coast of Celebes, longitude 120. 48. east, latitude 5. 38. south; a third, a small island near the south-west coast of the island of Bouton, longitude 122. 50. east, latitude 5. 33. south; and a fourth, an island on the north coast of New Holland, near the head of the Gulf of Carpentaria, included by Captain Flinders under the general appellation of Sir Edward Pellew's Group. Long. of Pellew Cape, the northern extremity of the island, 137. 2. E. Lat. 16. 30½. S.

NORTH POINT ISLES, several small islands near the north-east coast of New Holland, in latitude 22. S.

NORTH POINT ISLET, a small island on the north coast of New Holland, in the Gulf of Carpentaria, near the island of Groote Eylandt. Long. 136. 45. E. Lat. 13. 37. S.

NORTH ROCKS, otherwise called St Patrick's Rocks, from a seat of stone amongst them called St Patrick's Chair, whence the rocks have taken this second name, are

situated in the harbour of Donaghadee, in the county of Down, and province of Ulster, in Ireland. From north to south they are about two thirds of a league, between which is clear good ground. But care must be taken to avoid the south rock, on which many ships have perished; for it is overflowed by every tide, and no crew can save their lives if the wind blows high. This rock stands fully a mile from the shore.

NORTHALLERTON, a borough, market-town, and parish, in the north riding of the county of York, 225 miles north-north-west from London. It is situated on the side of an eminence, which, rising from the banks of a branch of the river Swale, called the Wiske, slopes gently towards the east, and consists chiefly of one broad street about half a mile in length. It is surrounded by an exceedingly rich and fertile tract of country, the parish alone containing 13,000 acres of land. The market-place is spacious, and is surrounded by commodious houses, built principally of brick. The town was formerly celebrated for its fine ales; its chief manufactures at the present time are those of leather and linen. The church is a handsome Gothic structure, built in the form of a cross, and containing several fine old monuments. There is likewise a grammar school, of ancient but uncertain foundation. A new prison was erected, as a relief to the county jail of York, several years ago, according to a plan of Howard. Here was formerly a castle, as well as a convent for nuns; but no vestige of either now remains. This town has a weekly market on the Wednesdays, and five fairs are held during the year. At a short distance from the town was fought the celebrated battle of the Standard, in the year 1138, between the English and the Scots, when the latter were defeated. The government of the borough is vested in a bailiff, deputed by the Bishop of Durham, who is lord of the manor; and it returns two members to parliament. The population of the parish amounted in 1821 to 4431, and in 1831 to 5118; that of the borough amounted in 1821 to 2626, and in 1831 to 3004.

NORTHAMPTON, a borough and capital town of the county of the same name, sixty-six miles north from London. It is situated on a gentle elevation, on the northern bank of the river Nen. The borough, which is of very old standing, extends from the north to the south upwards of two miles, and from east to west about one mile and a half. These limits contain the parishes of All-Saints, St Sepulchre, St Peter, St Giles, and certain extra parochial places. At an early period it was deemed worthy of being a royal residence. The castle then erected for this purpose was built at the west side of the town, upon an eminence, under which the river runs, and traces of the remains are still to be found. Parliaments were repeatedly held here in the reigns of the first Edwards. The town was formerly surrounded by a wall, and contained several monastic institutions; but these decayed through time, or were destroyed at the Reformation, or by the fire in 1675, when the town was nearly burned to the ground. An act of parliament was passed for the rebuilding of the town; and from the funds raised by subscription, as well as from the aid bestowed by the king, the damage occasioned by the disaster was entirely repaired. The town may be said to be nearly divided into four equal parts, by two streets running in the direction of the cardinal points, whilst various other by-streets extend through the town. Both of these streets are wide and spacious, and each extends nearly a mile in length; the limits of the burgh, as has already been mentioned, extend farther. The street called the Drapery, though not the largest, is the finest in the town, both for its breadth and the handsome appearance of its shops. At the south end of the Drapery, and the west end of St Giles, is the market-place, 600 feet square, surrounded by handsome shops and neat private dwellings, and said to be one of the

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Northampton. handsomest market-places in Europe. The town is clean, and most of the houses are built of a reddish coloured stone dug in the neighbourhood; the others are of brick. With the exception of the Drapery and other principal streets, the houses present an uniform appearance, and are almost entirely occupied by journeymen shoemakers and other workmen employed in that trade. A great increase of houses of this description has taken place during the last few years. The principal building ground still unoccupied lies in the parishes of St Giles and St Sepulchre; but very active measures are now in progress to open new streets, and extend buildings upon it in every direction. The borough is evidently in a flourishing condition. The inhabitants are chiefly engaged in the shoe, leather, stocking, and thread-lace manufactures. The principal manufacture, however, consists in that of boots and shoes, which has thriven and increased during the last thirty years, without being affected by the various changes which have occurred during that period. The present wages paid weekly to the journeymen amount to L.2000. Great quantities of the shoes and boots are sent to London, as well as exported. This is greatly promoted by the Northampton Canal, which, uniting with the Grand Junction Canal, gives water communication to the principal manufacturing and mining districts, the ports of London, Liverpool, Bristol, and Hull. There are also three well-employed iron-foundries in the town. The town formerly had seven churches within the walls, and two without, but there are now only four in all. The principal church, All Saints, stands nearly in the centre of the town, at the junction of the four leading streets; it is a handsome building, with a fine portico of eight Ionic columns, and is surmounted by a statue of Charles II. The church of St Sepulchre is of a circular form. St Peter's deserves notice only as a relic of ancient architecture. St Giles has nothing remarkable. There are likewise places of worship for Presbyterians, Quakers, Methodists, Baptists, and Roman Catholics. We may add, that there are various charitable institutions for education and the support of the poor. On the eastern side of the town, in an airy and salubrious situation, is the infirmary. The town-hall, county-hall, county jail, town jail, and theatre, are all respectable buildings. The town is lighted with gas. The horse fair held here is considered as the best in the kingdom for saddle and carriage horses. The town is divided into three wards, and is governed by a corporate body, consisting of a mayor, six aldermen, seventeen councillors, twelve justices of the peace, a recorder, and town-clerk. Northampton returns two members to parliament; the number of voters is about 1800, and the returning officer is the mayor. The market-days are Wednesday and Saturday. The population amounted in 1801 to 7220, in 1811 to 8427, in 1821 to 10,844, and in 1831 to 15,351.

NORTHAMPTON, a post-town and shire-town of Hampshire county, Massachusetts, one of the United States of North America. It is beautifully situated on the west bank of the Connecticut River, ninety-five miles west from Boston. It consists chiefly of two streets, proceeding like the radii of a circle, although with many irregularities. It contains several handsome public buildings, of which the court-house, jail, and one of the religious meeting-houses, are the most conspicuous. The private houses are in general large, and in a good style, and many of them are elegant. Northampton is a place greatly resorted to by travellers, from the romantic beauty of the scenery in the vicinity. The common schools of this place are highly respectable. A stream passes near the centre of the town, on which are erected numerous mills and many manufactories, amongst which are two of woollen. Farmington Canal extends from New Haven to this place. A bridge, built in 1826, connecting this town and Hadley, is 1086 feet in length by thirty-six in breadth, and is supported by

six piers and two abutments. The Indians called this town **Northamptonshire.** Nonatuck. It was the third place settled on the river in this state, and was incorporated in 1654. Amongst the striking objects in the scenery of Northampton are the beautiful river, and the heights called Mount Tom and Mount Holyoke, the former being 1200 and the latter 900 feet above the river. The population amounted in 1830 to 3618. Long. 72. 40. W. Lat. 42. 16. N.

NORTHAMPTONSHIRE, an inland county of England, nearly in the centre of the kingdom. It is of an irregular and very extended figure, being about sixty-seven miles in length. In the widest part it is thirty miles, and in the narrowest not more than eight miles in breadth. The extent, according to the returns collected by Mr Rickman, is 646,810 acres. The land is thus appropriated:—About 290,000 acres are in arable cultivation, 235,000 acres are in pasture, and about 86,000 are uncultivated, or occupied as forests and woodlands. The county contains one city, eleven market-towns, 301 parishes, and is divided into 1901 liberties.

The population, according to the official returns at the four decennial enumerations, amounted in 1801 to 131,757, in 1811 to 141,353, in 1821 to 162,483, and in 1831 to 179,300. The annual value of the whole real property of the county, as taken in the year 1815 for the purposes of the property-tax, was L.942,162. The burials, including both the registered and the unregistered, in the ten years from 1821 to 1831, appear to have been about one in fifty of the whole number of inhabitants then living. The illegitimate births were one in twenty-five of the whole number born.

The occupations of the people, according to the returns arranged by Mr Rickman in 1831, were as follow:

Occupiers of land employing labourers.....	3,015
Occupiers of land not employing labourers.....	1,117
Employed in retail trades or handicraft.....	13,841
Capitalists, bankers, and professional men.....	1,264
Labourers not agricultural.....	2,619
Other males under twenty years of age.....	2,874
Male servants under twenty years of age.....	417
Ditto above twenty years of age.....	706
Female servants.....	5,678

From its oblong shape, lying obliquely across the middle of the kingdom, Northamptonshire comes in contact with, and is bounded by, a greater number of other counties than any other division of England. Proceeding from the north, on its western side, it touches upon Lincolnshire, Rutlandshire, Leicestershire, Warwickshire, and Oxfordshire; and on its eastern side it is bounded by Buckinghamshire, Bedfordshire, Huntingdonshire, and Cambridgeshire. The whole of the county is within the diocese of Peterborough, with the exception of three parishes which are included in the see of Lincoln.

Northamptonshire is generally a pleasant country, with such undulations as give an agreeable variety; but, owing to the numerous enclosures, the prospects are not in general extensive, except upon the summits of the higher hills. The centre of the county is a level elevation, from which the rivers have their rise, and, descending in opposite directions, take a course both to the German Ocean and the English Channel.

The agriculture of this county partakes so much of the nature of the several counties that border on it, as to be almost as various, and not to merit any particular description. The most important rural pursuit is the grazing of cattle, for which the excellent pastures are admirably adapted. The cattle, when fattened, are sent in weekly droves to the market of Smithfield for the supply of the metropolis, where they are highly esteemed. The arable land produces excellent wheat, beans, and oats; but the soil in

Northamptonshire. general is not well calculated to raise good barley. The artificial grasses, clover, trefoil, sainfoin, and rye-grass, are very extensively cultivated, and, aided by turnips, form important articles of food for the flocks and herds.

Within this county there are several large forests belonging to the crown, with two chases, over which the king has certain rights. The largest of these is the Forest of Rockingham, in the northern part of the county, extending over 11,000 acres. The land, in many instances, belongs to individuals; but the royal deer have, under certain restrictions, the range over the whole. Whittlewood Forest contains about 5000 acres. It is stocked with about 1000 deer; a proportion of which, according to ancient prescription, are killed annually for the royal household, and for the great officers of the government, who receive them as a matter of right attached to their appointments. This forest contains much excellent naval timber, which is reserved for the use of the government; but, from the reports of the commissioners, it appears to be very negligently preserved, and very injudiciously managed. Salcey Forest is about 1850 acres in extent. This tract was formerly covered with most valuable ship-timber, but has furnished for the navy only a very small proportion of what it is capable of. The mixture of opposite interests in this kind of property diminishes its productiveness to all the parties interested in it. The underwood does not belong to the crown. The individuals who own it cut it down every twenty-one years. During the following nine years it is enclosed, and for the remaining twelve it is open for the deer to feed on the land. The crown enjoys only this right of pasture and the timber trees. The pasture does not belong exclusively to it, for many of the surrounding parishes possess also a right to turn their cattle into the forests, under ancient grants and prescriptions, and with limitations of a complex nature, which are productive of perpetual dissensions and litigations. The rangership of these forests is hereditary in the Dukes of Grafton, who have, during the last century, derived from it a very large income, whilst the revenue to the crown has been very trifling, scarcely amounting to L.200 per annum upon an average of the last hundred years.

The only navigable river in this county is the Nen or Nine. It rises in the western part, flows across, and then runs north, till it enters by Lincolnshire into the German Ocean. The Welland rises in the county, then forms the boundary between it and Leicestershire and Rutlandshire, and only becomes navigable after entering Lincolnshire at Stamford. The other rivers, the Ouse, the Avon, the Leam, and the Charwell, although they have their sources in Northamptonshire, are but inconsiderable rivulets till they enter the contiguous counties. The benefits of internal navigation have been very freely bestowed here by the canals, which afford great facilities to internal intercourse. The Oxford Canal connects it with that city. The Grand Junction Canal, communicating on one hand with London, and on the other with Liverpool and Manchester, passes through this county. The Grand Union Canal connects it with Leicester. Thus the heavy products, especially coals, are brought to every part on very moderate terms. Great advantage to this county is anticipated from that great work, now hastening to its completion, the London and Birmingham Railway, which will enter it near Stony Stratford, and proceed more than thirty miles, when it will advance through a corner of Leicestershire to Warwickshire.

The remains of Roman and Saxon antiquities are very numerous. Amongst the former, the Watling Street Road, the Ermine Street Road, the camps of Arbury, of the Boroughs, and of Rainsbury, and the tessellated pavements at Cotterstock, at Stanwick, and at Woodford Field, have engaged the attention of Stukely and other eminent anti-

quaries. As there were more than sixty monasteries and other religious houses at the period of the Reformation, traces of which may still be seen, they, with the baronial castles, present a wide field for the researches of the lovers of antiquity; but the bare enumeration of them would be incompatible with the limits of this work.

The manufactures of this county are chiefly of a domestic nature, and carried on in the dwellings of the workmen. Boots and shoes are made for foreign markets, and, in war, for the supply of the army. Both fine thread and silk lace are made, and afford employment to the females, who are taught the art in schools for that purpose, and attain great perfection. The principal places for collecting the lace are Northampton and Wellingborough. A large quantity of horse-whips were made at Daventry, and, though diminished in some degree, the trade is still continued there.

The titles derived from this county are Duke of Grafton; Marquis of Northampton; Earls of Peterborough, Fitzwilliam, Spencer, and Harrington; Viscount Sackville; Barons Braybrooke and Lilford; and as second titles, Baron Burleigh to the Marquis of Exeter, Viscount Milton to Earl Fitzwilliam, Viscount Brackley to the Earl of Bridgewater, and Baron Finch to the Earl of Winchelsea. By the reform act this county is formed, for the purpose of electing members of parliament, into two divisions, distinguished into North and South, each returning two members. The election for the northern division is held at Kettering, and the polling places are, that town, Peterborough, Oundle, Wellingborough, and Clipston. The election for the southern is held at Northampton, and, besides that town, at Daventry, Towcester, and Brackley. The boroughs of Brackley and Higham Ferrers were by the same law disfranchised.

The most celebrated natives of Northamptonshire have been, Robert Browne, the founder of the sect of Independents; Mrs Chapone; John Dryden, the poet; Fletcher, the dramatist; Fuller, the historian and divine; Harrington, author of the *Oceana*; Hervey, author of *Meditations* and other works; Knolles, the historian of the Turks; Dr William Paley; Bishop Wilkins; and Thomas Woolston.

The catalogue of all the noblemen and gentlemen's seats in this county would extend to a long list, and we therefore can only notice the most remarkable of them, viz. Castle Ashby, Marquis of Northampton; Aldwinckle, Lady Lilford; Althorp, Earl Spencer; Apethorpe, Earl of Westmoreland; Brinworth, Walter Strickland, Esq.; Burleigh, Marquis of Exeter; Canons Ashby, Sir J. E. Dryden; Cottesbroke, Sir James Lanham; Courteen Hall, Sir William Wake; Dean, Earl of Cardigan; Drayton, Duke of Dorset; Easton Neston, Earl Pomfret; Ecton, Samuel Isled, Esq.; Fawsley Park, Sir Charles Knightley; Finedon Hall, Sir William Dolben; Horton, Sir Robert Gunning; Kirby, George Finch Hatton, Esq.; Lamport, Sir Justinian Isham; Lilford, Lord Lilford; Martin's Thorpe, Earl of Denbigh; Milton Abbey, Earl Fitzwilliam; Rockingham Castle, Lord Sondes; Salcey Forest, Earl Euston; Wakefield Lawn, Duke of Grafton; Walgrave, Sir James Langham; Whittlebury, Lord Southampton.

The towns having a population exceeding 1400 are the following:

Northampton.....	15,351	Brackley.....	2,107
Peterborough.....	5,553	Buckby, Long.....	2,078
Wellingborough.....	4,688	Rothwell.....	2,002
Kettering.....	4,099	Paulers Pury.....	1,544
Daventry.....	3,646	Weedon.....	1,439
Towcester.....	2,671	Middleton Cheyney..	1,415
Oundle.....	2,450		

NORTHCOTE, JAMES, a distinguished English painter, was born at Plymouth in the year 1746. He evinced a predilection for the arts at a very early period, but received no encouragement from his father, who was an eminent

Northcote. watchmaker, and apprenticed him to his own trade. When the period of his indenture had expired, the strong bent of young Northcote's genius prevailed; and being fortunate enough to obtain a recommendation to Sir Joshua Reynolds, that eminent artist received him as a pupil. Northcote had nearly reached his twenty-fifth year when he arrived in London; and having had comparatively little experience in painting previously to this period, his attainments were greatly inferior to those of other beginners much younger than himself. It was therefore with no great reliance on his talents that Sir Joshua gave him a trial; but diligence and native genius soon made amends for all deficiencies, and, much to the satisfaction of his master, with whom he became a favourite pupil, his improvement was rapid. He was also of an age to be a pleasant companion to Sir Joshua; and from his great natural talents, and extraordinary powers of conversation, he was enabled to avail himself of all the advantages of that polished society which assembled in the house of his master. Northcote remained domesticated for five years, on the most agreeable terms, in Sir Joshua's family; and in 1776 he reluctantly quitted an abode which had in every way been rendered delightful to him. He commenced portrait painter, in which he would doubtless have attained great eminence; but his powerful intellect was scarcely satisfied with this limited branch of art, and he resolved to prosecute the more independent and pleasing, although much less lucrative, study of historical painting. In furtherance of this object, he, in 1777, repaired to Italy, where he remained three years, devoting his time alternately to the study of the great masters, and to original compositions. During his sojourn on the Continent, he was elected a member of the Imperial Academy at Florence, of the ancient Etruscan Academy at Cortona, and of the Accademia delle Arti at Rome. He was also requested to execute a portrait of himself, to be placed amongst those of distinguished artists which grace the gallery at Florence; and the picture which he presented is at once a faithful resemblance and an exquisite specimen of his professional skill.

On his return to England, Northcote pursued the study of design with all the ardour of an artist; and it was soon apparent that he had not mistaken his forte or miscalculated his powers. About this period Mr Boydell was engaged in procuring engravings from pictures by the old masters, whose works he had either obtained the use of, or had caused to be copied by skilful hands. His next experiment was to commission native artists of distinction to paint original composition from history and other subjects, and to cause these also to be engraved by Englishmen. Northcote being one of the most promising painters of the British school, was employed by Mr Boydell, and also by other printsellers; and prints from his designs were to be seen, framed and glazed, upon the walls of the higher order of dwellings in every part of the kingdom. One of the most admired, entitled the Village Doctress, had for several years a considerable sale. It was not, however, until the Shakespeare Gallery was opened, that the world was made fully aware of the powers of Northcote. Amongst the many splendid efforts of British art which were thus collected together, none proved more attractive than his compositions. The scene of the smothering of the young princes in the Tower of London; that of removing their bodies secretly by torch-light for interment at the foot of the stone steps; the subject of Arthur and Hubert; the entrance into London of Richard II. and Bolingbroke, and others from his pencil, are undoubtedly to be reckoned amongst the best specimens of British art at this flourishing period of its history. These productions clearly proved how well he had studied the works of his illustrious master, and imbibed his feelings as a colourist. Northcote had now attained the zenith of his fame; and

he received the reward of his abilities by being elected an associate of the Royal Academy on the 6th of November 1786, and a royal academician on the 13th of February 1787.

From this period Northcote divided his professional labours between historical compositions, fancy subjects, and portraiture. The dramatic style, however, attracted his attention for a time, and he painted a series of moral subjects, illustrative of virtue and vice, in the progress of two young women. This was trenching upon the ground of Hogarth, and the attempt proved a failure; for although the main points of this graphic drama bore directly upon the subject, the characters were deficient in expression and individuality. In painting, Northcote kept the colouring of Sir Joshua Reynolds steadily in his eye; and so little change in his style had his contemplation of the great masters in Italy wrought, that no one could discover the least approach to that severity of manner which is peculiar to the Roman and other Italian masters. His pictures are distinguished for their breadth of light and shade; and most of his historical works display a comprehensive and accurate knowledge of the subject, much study, and considerable force of conception. For a period of above thirty years his productions may be said to have borne a conspicuous part in the exhibitions at Somerset House; and, to the last year of his life, a season seldom elapsed without his presenting one or more efforts of his pencil at the British Institution or the Gallery of the British Artists.

That Northcote was an enthusiast in his art may be gathered from many anecdotes related of him whilst expatiating upon the merits of the great masters. A favourite pursuit of his was the painting of wild animals; and one day, whilst making a study from nature of a vulture, he laid down his palette, and clasping his hands, exclaimed, "I lately beheld an eagle painted by Titian, and if heaven would give me the power to achieve such a work, I would then be content to die." His conversational powers have been extolled by all who had an opportunity of knowing him; but he never allowed the fascinations of society to interfere with his professional avocations. It was his custom for many years to take an early morning walk, on his return from which he breakfasted, and then went to his studio. About eleven in the forenoon, unless he had an engagement with a sitter, his levee commenced. It seldom happened that he remained alone; one visitor succeeding another, and occasionally three or four at a time, holding him in conversation until the hour for dinner. All the while he was proceeding with whatever picture he had on hand, working and talking at the same time. His conversation was distinguished by sagacity, acuteness, and great extent of information, as may be seen from a volume published by Mr Hazlitt, entitled *Conversations with the late James Northcote, R. A.* He had, however, much of that cynical spirit too prevalent amongst artists, of depreciating the works and characters of their rivals; but he was benevolent withal, and whatever he might say in disparagement of those who crossed his path, he was ever ready to befriend those who applied to him for assistance or advice. To young artists he was kind and condescending, and always easily accessible. Such traits in the pictures or drawings which they submitted to him as happened to display originality and talent, gave him delight; for he felt a patriotic pride in the arts of his country, and a personal interest in their advancement. In whatever company Northcote might be, he always maintained his opinions, which were often singular, with a manly independence, which secured him general respect. One day a royal duke, whilst attending at a sitting of Master Betty, the young Roscius, whom Northcote, with his usual sagacity, thoroughly despised, used some liberties with the ar-

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tist's gray locks, observing, "You do not devote much time to the toilet, I perceive?" Northcote instantly replied, "Sir, I never allow any one to take personal liberties with me; you are the first who ever presumed to do so, and I beg your royal highness to recollect that I am in my own house." He then resumed his painting, and the royal personage, feeling the rebuke, shortly afterwards took his departure. Next day, however, the artist was surprised by a visit from his royal highness, who, in returning something of which he had obtained the loan, handsomely apologised to him for the liberty which had been thoughtlessly taken.

Northcote was naturally just, temperate, careful, and in the strictest sense of the word a philosopher. The system of life which he early prescribed for himself was founded on wisdom, and maintained with constancy. The frugal manner in which his table was served from principle might lead to the idea that he was parsimonious; but this is rendered nugatory by the facts, that he lent money freely without asking for interest, and sometimes not even for the principal, by which means he frequently lost it; that he was the most patient and long-suffering of creditors, not only feeling a horror at asking for what was justly due him for his works, but often having whole-lengths, half-lengths, and bust portraits thrown upon his hands without his ever attempting to enforce payment. His prudence and foresight, however, enabled him to secure an independence for the evening of life, which so often overtakes artists in destitution and misery. The last years of Northcote's life were spent in preparing for the press a volume of fables and a *Life of Titian*. He died on the 13th of July 1831, and his remains were deposited in the church of St Mary-le-Bone on the 20th of the same month.

Northcote was an author as well as a painter. His earliest productions were some papers inserted in a periodical work called *The Artist*. The subjects of these papers were, *Originality in Painting*, *Imitators and Collectors*, *Disappointed Genius*, a *Character of John Opie*, *Letter from a Disappointed Genius*, and the *Imitation of the Stage in Painting*. In the second volume of the same work, the *History of the Slighted Beauty*, an allegory, was also by him. He further contributed to the fine arts of the English school the biography of Sir Joshua Reynolds, which he afterwards expanded into a quarto volume, entitled *Memoirs of Sir Joshua Reynolds*, comprising anecdotes of many distinguished persons, his contemporaries, and a brief analysis of his *Discourses*; to which are added, *Varieties on Art*, 1813. A supplement to the work appeared in 1815; and an octavo edition, with considerable additions, came out in 1819. In 1828 he published, in octavo, *One Hundred Fables*, original and selected, embellished with two hundred and eighty engravings on wood from his own designs. He likewise left materials for a second series, which by directions given in his will was to be published after the death of his sister. His last work, which appeared at the close of the year 1830, in two volumes octavo, is the *Life of Titian*, with anecdotes of the distinguished persons of his time; a work containing a vast mass of useful information and reflection on the art of painting. (R. R. R.)

NORTHERN LIGHTS, the same with the *Aurora Borealis*. See *AURORA BOREALIS*.

NORTHFLEET, a town of the county of Kent, in the hundred of Toltingtrough, and lathe of Aylesford, twenty miles from London, on the road to Dover. It is situated on a chalk hill rising from the south bank of the Thames, and commanding an extensive view of the river, and of the county of Essex beyond it. Great quantities of lime are made from chalk, and the flints collected are prepared for fire-arms. Northfleet has now no market. The population amounted in 1801 to 1910, in 1811 to 2031, in 1821 to 1964, and in 1831 to 2124.

NORTHLEACH, a town of the county of Gloucester,

in the hundred of Bradley, eighty-one miles from London. Northumberland. It is situated in the centre of the range of the Cotswold Hills, on the river Leach, and was once a clothing town of some consideration, but that trade is lost. There is here a bridewell for the county, and a free grammar-school. It is a corporate town, and has a market which is held on Wednesday. The population amounted in 1801 to 664, in 1811 to 647, in 1821 to 773, and in 1831 to 795.

NORTHUMBERLAND, an extensive county in England, situated on its northern extremity, upon the borders of Scotland, from which it is separated partly by the river Tweed, which, during the latter part of its course, flows between this county and Berwickshire, and partly by a line supposed to be drawn over the mountainous region on the west and north-west, where it meets with Roxburghshire. The other boundaries are the German Ocean on the east, Durham on the south, Cumberland on the west, and on the north two small districts called Norhamshire and Islandshire, which, though belonging by their situation to Northumberland, form a part of the county of Durham, along with another tract called Bedlingtonshire, on the south-east. But in a general description it is unnecessary to attend to these distinctions. The Tweed may, therefore, be considered as the northern boundary of the county, and in this case it will include the towns of Berwick and Norham. Lindisfarne or Holy Island, on the north-east coast, which in like manner belongs to Durham, is situated about two miles from the mainland, opposite to the mouth of the brook Lindis, and accessible to all kinds of conveyance at low water. Although about nine miles in circuit, it contains little more than 1000 acres, the half of which is sand-banks. These several portions may extend to something more than 100 square miles, or about one twentieth part of the whole. In this view, Northumberland is situated between 54. 51 and 55. 48. north latitude, and between 1. and 2. 27. west longitude from London. Its greatest extent from north to south is sixty-four miles, and from east to west it varies from about forty-six miles, which is its usual breadth between the river Tyne on the south and the Coquet on the north, till it terminates at the town of Berwick on the north, in a breadth of only five or six miles. According to Mr Rickman's Report of 1831, the area of the county is 1871 square miles, or 1,197,000 acres; but the actual returns from the parishes give only 1,165,430 acres, a difference which is supposed to arise from the inaccurate measurement of the mountainous and uncultivated part of the western division of the county. Nearly one third of the county is scarcely capable of beneficial cultivation.

It is divided into six wards, namely, Tindale, Coquetdale, Glendale, Bamborough, Morpeth, and Castle, the first three comprising the western and mountainous district, and the second three the coast lands on the east. These last, though extending over only one fourth of the county, are by far the most wealthy and populous, owing chiefly to the great coal-works in Castle ward, near the town of Newcastle, and along the banks of the Tyne. It contains five deaneries and seventy-three parishes, all of which are in the archdeaconry of Northumberland and diocese of Durham.

All the western side of this county is mountainous, from the common boundary with Durham on the south, almost to the valley of the Tweed on the north; but this extensive tract, comprising more than a third of the whole area, is not all of the same character; the northern, or Cheviot Hills, extending to about 90,000 acres, being mostly all green nearly to their summits, comprehending many narrow but fertile glens, and affording excellent pastures for the breed of sheep to which they have given their name; whilst those to the west and south are, in general, open solitary wastes, covered with heath, and of very little value. On the coast, from the mouth of the Tyne to that of the Tweed, and also on the north, throughout its whole breadth

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berland.

from Belford to Mindrum, the country is, with few exceptions, level and rich, with a soil which in some places is a strong clay, and in others a dry loam, but almost everywhere very productive, under the enlightened system of cultivation which prevails so generally throughout Northumberland.

The principal rivers of the county are the Tyne, Blyth, Wansbeck, Coquet, Aln, and the Tweed, all of which fall into the sea, carrying with them the tribute of many smaller streams. The Till, which empties itself into the Tweed, is also a considerable rivulet. The Tyne and Tweed are by far the most important, the tide flowing up the former sixteen miles, and up the latter eight or ten miles; whilst the navigation of the other rivers is confined to a small distance from their mouths. Both of these have long been celebrated for their salmon fisheries, which yield great rents, and afford a valuable article of trade with London, to which the fish are sent packed in pounded ice, by which means they are presented in the market in nearly as fresh a state as if they had been newly taken from the water.

Northumberland has been long distinguished for its subterranean treasures, which are the main source of its wealth and population. Of these, coal, which abounds in most parts of it, is by far the most important. It is of the best quality in the south-eastern quarter, on the banks of the Tyne, whence those vast quantities are exported which supply the great consumption of the metropolis, as well as the coasting and foreign trade. In some years the exportation from the port of Newcastle has amounted to upwards of 600,000 chaldrons of fifty-three cwt. each, and probably, as much more has been sent from Sunderland and consumed in Northumberland and Durham, the same coal-field extending across the Tyne to the latter county. This coal is all of the kind called "caking coal," which melts and runs together in the fire, and, when of the best quality, leaves very few ashes. Calculations have been made as to the extent of this tract, the quantity of coal which it may contain, and the period when it must be exhausted; but upon this last point there is a great difference of opinion, some estimating that the supplies must cease in three hundred years, some not in less than eight hundred, whilst by others it is held to be almost inexhaustible. Of the coal found in Bamborough, Islandshire, and Glendale ward, the seams are in general thin, and the quality inferior, not caking nor burning to a cinder, but yielding a great quantity of ashes. This is used only for home consumption and for burning limestone, a purpose for which it is well adapted; and through all this district coal and lime are generally found together. The south-eastern quarter, which is so rich in coal, is destitute of limestone. Lead ore abounds in the mountains on the south-west, particularly towards the head of that branch of South Tyne called Allendale, where it has long been wrought to a considerable extent. Iron ore is found in many parts; stone marl near Tweedside, shell marl in Glendale ward, and various sorts of sandstone or freestone are obtained in almost every quarter, some of it affording tolerable slates for roofing, and flags for floors. Excellent grindstones are raised in the sandstone quarries, of which a great many are exported from Camus and Warkworth.

The agriculture of Northumberland is an object which is only second in interest and importance to its coal works. Almost all those branches of rural economy for one or more of which other districts are celebrated, may here be found combined into one system, and conducted upon the same farms. One finds here the Leicester sheep and the short-horned cattle of Durham and Yorkshire, both in great perfection; the turnips of Norfolk cultivated upon the drill system of Scotland; the well-dressed fallows of East Lothian and Berwickshire; and that regular alternation of

tillage and grazing which is, of all other courses of cropping, the one best adapted to sustain and even to improve the productiveness of the soil. These remarks apply in an especial manner to the northern part of the county, where the farms are in general large, and the occupiers men of education and liberal acquirements. This quarter has been long distinguished as a school of agriculture, to which pupils are sent, some of them gentlemen of fortune, from various parts; a character for which it is eminently indebted, as well as for other distinctions, to the late Messrs Culley, who were amongst the most extensive and successful farmers in the kingdom. The common period of leases, at least in the northern district, is twenty-one years, although many are shorter, and upon a few estates no leases are granted. By the account taken for the purpose of levying the property-tax in the year 1815, it was found that the annual value of the real property amounted to L.1,240,594. It may be worthy of remark here, that at the seat of the Earl of Tankerville, called Chillingham Castle, there still exists in the forest the remains of the herds of wild cattle which are supposed to have formerly abounded in this island, and to have been the origin of our races of cows.

Northumberland is not eminently a manufacturing county. Some wool-combing is carried on at Hexham, and some thread is spun in the villages; but the chief branches of manufacturing industry are those depending upon the cheapness of iron and coal, and are chiefly carried on within and around the town of Newcastle, to which head in this work the reader is referred.

The population of the county at the four decennial enumerations has been as follows:—In 1801 it amounted to 157,101, in 1811 to 172,161, in 1821 to 198,965, and in 1831 to 223,000. The burials, including both the registered and unregistered, in the ten years from 1821 to 1831, appear to have been one in fifty-two of the whole number of inhabitants then living. The illegitimate births were one in fifteen of the whole number born.

The occupations of the people, according to the returns arranged by Mr Rickman, were in 1831 as follows:

Occupiers of land employing labourers.....	2,376
Occupiers of land not employing labourers.....	1,268
Employed in retail trade and handicraft.....	17,149
Capitalists, bankers, and professional men.....	2,857
Labourers not agricultural.....	13,930
Employed in manufactures or machinery.....	1,252
Other males under twenty years of age.....	3,228
Male servants of all ages.....	961
Female servants.....	10,263
Agricultural labourers.....	10,441

The number of inhabited houses was in 1831.....35,726 In these there were 48,364 families, of whom 10,127 were chiefly employed in agriculture, 14,246 in trade or manufactures, and 23,091 belonged to neither of these classes. This county is included in the northern circuit. The assizes are held at Newcastle, and the quarter-sessions successively at Newcastle, Morpeth, Hexham, and Alnwick.

The title of duke of this county belongs to the family of Percy, though now in the female line. The Earl of Carlisle derives his second title from the town of Morpeth. For the purposes of election two divisions are formed, each returning two members. The elections for the northern division are held at Alnwick; and the polling places are, besides that town, Berwick, Elsdon, Morpeth, and Wooler: for the southern they are held at Hexham, and the other polling places are Bellingham, Haltwhistle, Hexham, Newcastle, and Stamfordham. There are two boroughs within the county; Newcastle, which returns two members to the House of Commons; and Morpeth, which also returned two before the reform bill, but at present only one. Berwick, which, though for some purposes a county of itself,

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berland.

Northumberland may be considered as in Northumberland, returns two members.

North-berland Islands	The towns containing more than 1500 inhabitants, with their population in 1831, were the following, viz.
North-West Territory.	Newcastle.....42,760
	Tynemouth.....24,778
	Berwick.....8,920
	Alnwick.....6,788
	North Shields.....6,744
	Long Benton.....6,613
	Hexham.....6,042
	Walls-end.....5,510
	Morpeth.....4797
	Haltwhistle.....4119
	Ford.....2110
	Wooler.....1926
	Lowick.....1864
	Hartley.....1850
	Blyth.....1769

The most remarkable of the noblemen and gentlemen's seats are, Alnwick Castle, the Duke of Northumberland; Chillingham Castle, the Earl of Tankerville; Haggerstone Castle, Sir Carneby Haggerstone; Howick House, Earl Grey; Falloden House, General Grey; Bamborough Castle, Lord Crewe; and Barmour Castle, F. Sitwell, Esq.

NORTHUMBERLAND ISLANDS, a chain of islands in the South Pacific Ocean, near the north-eastern coast of New Holland, which runs parallel to the mainland at the distance of from five to eight miles. The largest is about thirteen miles in circumference. Long. 149. 47. to 150. 37. E. Lat. 21. 32. to 22. S.

NORTHUMBERLAND STRAITS, a narrow channel of the Eastern Seas, between the islands of Calamianes and the shoals of Apo.

NORTH-EAST PASSAGE, a passage to the East Indies along the northern coast of Asia, which, like the North-West Passage, has frequently been attempted, but hitherto without success. See **POLAR SEAS**.

NORTH-WEST PASSAGE, a supposed passage to the Pacific Ocean through Hudson's Bay or Davis' Straits, and which has frequently been attempted, as yet with only partial success. See the article **POLAR SEAS**.

NORTH-WEST TERRITORY, a vast tract of country in North America, situated between 42. 30. and 49. north latitude, and 87. 30. and 95. 30. west longitude. It is bounded on the north by the British possessions and Lake Superior, on the east by Lake Michigan, on the south by Illinois, and on the west by the Mississippi, and a line drawn from the source of that river to the northern boundary. In length it extends about 500 miles, and in breadth about 400 miles. In some of its physical features this territory resembles that of Missouri; but a greater proportion of it is covered with wood. It is, generally speaking, a hilly country, with the exception of extensive levels of prairie land. At the western extremity of Lake Superior are the Cabotian Mountains; and near the mineral district are the Smoky Mountains. The chief rivers, with the exception of the Mississippi (see the article **MISSISSIPPI**), are the Ouisconsin, Fox, Chippeway, St Croix, Rum, St Francis, and Savannah of the Mississippi. Grand Portage, Ontonagon, Montreal, Mauvaise, Boisbrule, St Louis, and nearly fifty smaller streams, discharge themselves into Lake Superior. Riviere la Pluie falls into the Lake of the Woods. None of the lake rivers have a course of more than a hundred and fifty miles, and few of them more than fifty miles. The Ouisconsin, the largest tributary of the Mississippi in this territory, rises in the northern interior of the country, and interlocks with the Montreal of Lake Superior. It has a course of between three and four hundred miles, with a shallow and rapid current, which is, however, generally navigable by boats in good states of the water, and is 800 yards wide at its mouth. There is a portage of only half a mile between this and Fox River. It extends over a level prairie, across which, from river to river, there is a water communication for periogues in high states of the water. Fox River has a course of 260 miles,

flowing through Winnebago Lake, and into the Green Bay of Lake Superior. The country on its banks is very fine, and the climate is salubrious. Another considerable tributary of the Mississippi is the Chippeway, which enters it immediately below Lake Pepin. It is half a mile wide at its mouth, and has communication, by a short portage, with Lake Superior. This is one of the very best regions for hunters. In the upper part of the country, buffaloes, elks, bears, and deer, are common. Beavers, otters, and muskrats, are taken for their furs. The trappers, and also the Indian tribes, pursue their prey over an immense extent of prairie. The soil is fertile in some parts, and no doubt the enterprise and industry of civilized men will ere long bring a great portion of it under cultivation. White and yellow pine and white birch are common amongst the forest trees. All the water courses, ponds, and marshes, are covered with wild rice, which the inhabitants use as one of their chief articles of food. The elevation of the head waters of the Mississippi is estimated at 1330 feet above the level of the sea.

This country abounds in minerals, and rich veins of valuable ore have been discovered and wrought to considerable advantage. Great quantities of *terre verte* or green earth, lead, iron, and copper, are also found in it. The lead-mine district is situated in the lower part of the country, between Rock River and the Ouisconsin. The chief establishments of the present miners are on Fever River, and the mines are reckoned as rich and productive as any in the world. The following are the quantities produced in each year from 1823 to 1832.

Years.	Pounds.	Years.	Pounds.
1823.....	335,130	1828.....	11,105,810
1824.....	175,220	1829.....	13,343,150
1825.....	664,530	1830.....	8,323,998
1826.....	958,842	1831.....	6,381,901
1827.....	5,181,180	1832.....	4,281,876
Total in ten years.....50,752,626 lbs.			

The great increase in the years 1828 and 1829 reduced the price so low as to render the working of the mines in a great measure unprofitable. For upwards of half a century it has been confidently asserted that great quantities of native copper may be found along the northern shore of Lake Superior. On the Outogon there is a vast abundance of pure copper in detached masses. One of these masses is estimated to weigh 3000 lbs. The common reports, however, of the existence of large veins of copper, have not been confirmed by recent travellers; but there are nevertheless sufficient indications that mines of this metal are to be met with in this territory. Besides lead, iron is found in various places, and in great abundance.

In the southern portion of this large territory the climate is comparatively mild, and not unlike that of the northern belt of Missouri. At the Falls of St Anthony, on the Mississippi, the summers are temperate, whilst the winters are extremely cold. The sources of the Mississippi are in a region extremely inclement. At St Peters, in 1820, the mean temperature of January was zero, a degree of cold which is never experienced in any part of the United States that has been extensively settled. The summer, however, was temperate, and the atmosphere beautifully serene. Even at Prairie du Chien, although much more temperate, the winters are extremely severe. At the Falls of Packagama, on the Mississippi, about 1200 feet above the level of the sea, water has been known to freeze to a considerable extent in the middle of July. The following table, extracted from the work of an American writer, will convey the best idea of the nature of the climate in different parts of the North-west Territory:

North-West Territory.

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West Ter-
ritory.

Place.	Date.	Average Temperature.		Prevailing Winds.
		Air.	Water.	
Detroit.....	May 15 to 24.	60°	0°	North-east.
River St Clair.....	... 24 to 27.	51	52	North-west.
Lake Huron.....	... 28 to June 6.	51	51	...
Mackinack.....	June 7 to 13.	55	0	South-east.
Ditto to Lake Superior.....	... 13 to 18.	66	0	South-west.
Lake Superior.....	... 19 to 27.	66	58	North-west.
Ontonagon River.....	... 28 to 30.	80	73	...
Water of Lake Superior.....	.....	...	66	...
Ontonagon River to Fond du Lac.....	July 1 to 5.	64	61	South-west.
Between Fond du Lac and Sandy Lake....	... 6 to 16.	67	...	North-west.
At Sandy Lake.....	... 17 to 24.	73	...	...
From Sandy Lake to St Peters.....	... 25 to Aug. 1.	69	...	South-west.
Chicago.....	January.	15	...	North-west and south-west.
Ditto.....	February.	32	...	South-west.
Ditto.....	March 15.	29	...	North-east.

North-
wich.

The North-west Territory is divided, or rather marked off, into four counties, which have been named and partially settled by whites; but there are still a number of Indians in it. Prairie du Chien, Cassville, and Green Bay, are the largest villages; and the whole population has been estimated at 16,000. Green Bay settlement is situated at the outlet of Fox River, and contains 952 inhabitants. A few miles up Fox River, in a most romantic position, there is an interesting Episcopal missionary settlement. Prairie du Chien is of importance as a place of outfit from the Lower Mississippi to the upper waters. It is situated near a beautiful prairie, and there are flour-mills in its vicinity. Most of the permanent settlers here are a mixed race of Indians and whites. Frequent voyages are made from St Louis to Prairie du Chien in keel-boats. The richest copper mines, and the largest masses of pure copper, are said to be found here. One third of the land is capable of being farmed, and about one sixth is well timbered.

The whole of this vast region has been for some time politically connected with Michigan for the sake of convenience, but it must ultimately constitute a state by itself. Most of the lands are owned by Indians, or by the United States; the latter having recently made a purchase from the former of a very considerable tract of country. The following description of the Indian territory is from Flint's Geography: "The tract reserved to the Indians, of 500,000 acres, is also a fine body of land, containing very extensive and fertile meadows along the Fox River, with woodlands of good timber, in which there is no underbrush. The writer proceeded thirty-eight miles from Green Bay, up the Fox River, to Winnebago Lake, passing rapids whose whole descent is about 100 feet. The river is ninety yards wide, its bed a limestone rock, the banks from fifty to 150 feet high. The water is of course adequate to move any machinery. Doty's Island, in the outlet of the lake, contains 400 acres heavily timbered. The bank of the lake itself is covered with trees of a height and diameter indicating the nature of the soil, which is a black loam, rich and deep. The Cliff, so called, is a mountain 300 feet above the level of the lake, presenting a picturesque prospect. The main roads leading from Green Bay to Chicago, Ouisconsin, Portage, the Lead Mines, and Galena, will probably pass this point. Beyond this the mountain recedes three or four miles from the shore, forming a valley fifteen miles in length, of as fertile land as can be found in the United States, terminating to the south in a dry prairie called Cass Plains. These plains contain 25,000 acres of rich land, which are already cleared by nature for the plough, and they extend to the Manitoovoc River. Soon

after begin the prairies, which run, with scarcely any timber, to the Mississippi. In the whole distance, near 100 miles, passed by the writer, the land seems to be of the kind and aspect just described, namely, rich prairie, with occasional growths of fine timber, equally indicative of fertility. A road from the mouth of Fond du Lac River to Galena would be of great advantage to the mines, and a direct route for one might be followed at a trifling expense. It would facilitate the transportation of property from New York by the canal and the lakes."

NORTHWICH, a town of the county of Chester, in the hundred of the same name, being a part of the parish of Badworth, twelve miles from Chester and 174 from London. It is an old-fashioned and insignificant place, standing on the river Wever, which is navigable to Liverpool, and therefore of great importance to the produce in the vicinity of that town. There is an old well-endowed grammar school, and a weekly market held on Friday. The population, partly employed in the cotton manufacture, but chiefly in the preparation of salt, amounted in 1801 to 1338, in 1811 to 1382, in 1821 to 1490, and in 1831 to 1481. Near the town, on the south side, are those pits wherein are found the vast masses of salt which have supplied that condiment to the extent of several hundred thousand bushels for a very long period of time. The principal pit in the Northwich salt-mines is now called the Marston Pit, though it was formerly known under the name of the Burns's Pit. It consists of two levels, the lower of which is one hundred and twelve yards below the surface of the ground, and the other just half way down the shaft. The lower level is the most extensive excavation, as well as the oldest of the two, and has been worked about sixty years. The descent is into a magnificent chamber, apparently of unlimited extent, the flat roof of which presents so great an area, that astonishment is felt by the spectator at its not having long since given way. There is, however, no real want of security, it being as sound and durable as if formed of adamant, and is supported by pillars, in size like clumps of bricks in a brick-field; the extent of the area appears to the eye as if a space equal to Grosvenor Square were under cover. The beauty of the glistening particles of crystallized salt upon the walls, which are as hard as freestone, and the extreme regularity of the concentric curved lines, traced by the workman's tools, are very remarkable. Here and there the solid rock has been blasted, and marks of the jumper chisel are visible. Under foot the whole surface is a mass of rock-salt covered with a layer of the material crushed and crumbled to a state exactly resembling the powdered ice on a pond that has been cut by skaters.

Norway. Experiments have been made by boring to a depth of seventeen yards, but they have neither perforated the rock salt, nor do they at present know the thickness of the stratum. The height of this excavation is about fifteen feet, within which space the salt is estimated as being of the best quality; but above, it is somewhat inferior. Thirty-five thousand tons of salt were annually dug out of the different levels, and the area of the whole together amounts to forty-eight statute acres. At one part there is a vista of two hundred yards in length, which has been dignified by the name of Regent Street. The salt, after being prepared by the solution of the rock and evaporation, is formed by wooden moulds, with holes at the bottom, to allow the remaining water to pass through into cubical blocks, and in this state it is shipped, either by the river Weaver and the canal to Weston Point, and thence into the Mersey, or by the canal southward. A considerable quantity of this salt is exported to Prussia. Much salt is prepared from the brine springs, some of which are so strongly saturated as to hold in solution the greatest quantity of salt. To the water of some of these springs rock-salt is added whilst boiling in the pans. From these springs the water, or brine, is raised by a sunk shaft, and a pump worked by an ordinary machine.

NORTON, in Cheshire, a good modern alms-house, erected on the site of a priory of canons regular of St Augustin, founded in the year 1135, by William, son of Nigellus. But the latter did not live to complete his design; for Eustace de Burgaville granted to Hugh de Catharine pasture for a hundred sheep, on condition that he finished the church in all respects conformably to the intentions of the founders.

NORTON'S SOUND, on the north-west coast of America, was discovered in Captain Cook's last voyage, and was so named in honour of Sir Fletcher Norton, afterwards Lord Grantley, a near relation of Mr, afterwards Dr King. It extends as far as north latitude 64. 55. There is no good station for ships, nor even a tolerable harbour, in all the sound. Mr King, on his landing here, discerned many spacious valleys, with rivers flowing through them, well wooded, and bounded with hills of a moderate height. One of the rivers towards the north-west seemed to be considerable; and he was inclined to suppose, from its direction, that it discharged itself into the sea from the head of the bay. Some of his people, penetrating beyond this into the country, found the trees to be of a larger size the farther they proceeded. Long. 197. 13. E. Lat. 64. 31. N.

Norton
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Norway.

NORWAY.

NORWAY is an extensive country in the north of Europe, and, along with Sweden, forming one kingdom. All the countries which now comprise Norway, Sweden, and Denmark, were designated *Scandia* by the ancients. Pliny calls it *Scania insula*, an appellation which derives its origin from the circumstance of the Romans, in the time of their great naturalist, being only acquainted with that part of the country called Skanen or Skonen, the little information which they possessed being obtained from some Germans. This is the ancient province of Schonen or Scania, the most southerly of Sweden. The name was afterwards changed to Scandinavia, which has been called the "storehouse of nations;" but without any just title to such a distinction. It seems now pretty certain that Scandinavia was not the native country of the Scythians or Goths, but that they migrated from Asia to Europe. The fact of Pliny having designated Scandinavia as an island of considerable although uncertain magnitude, has also given rise to some discussion. To the imperfect knowledge of geography which the ancients possessed, may reasonably be attributed their mistaken notion as to the insular position of these countries; but the difficulty may be got rid of in another manner. It is well known that the Baltic Sea has diminished in height to a considerable extent, or, in the language of geologists, the coast on its shores has been elevated. In the course of about a century, this elevation is proved to have been considerable by the high-water marks left upon the rocks on the sea coast at different periods. If the sinking of the water or the rising of the land in this quarter has continued at the same rate from a very early period, then, at the time when Pliny wrote, Scandinavia, penetrated in every direction by gigantic arms of the sea, may have had the appearance of a number of islands of different forms and dimensions.¹

Origin of the name. But our present purpose is with Norway, which in Swedish is called *Norrige*, and in Danish, *Norge*, pronounced

Norre. "In spite of the vague ideas which the ancients entertained of the northern countries of Europe," says Malte-Brun, "it cannot be doubted that the country which Pliny² calls *Nerigou* is Norway. Many geographers³ have asserted that the name signifies the 'Way of the North;' but its true etymology seems to be *Nor-Rige*, Kingdom of the North, or rather, perhaps, assuming the word *Nor* as signifying *gulf*, Kingdom of Gulfs, because in effect its coasts are much more indented than those of Sweden. We thus see that the name of *Nerigou* has much more analogy with that of *Norrige* than with that of *Norweg*, which at the first glance appears to be the origin of the modern name."⁴ The early history of Norway is interwoven with the annals of Sweden and Denmark, and consists in legends contained in the *Heimskringla* or *Saga*, a collection of ancient manuscripts, which is to Norway what the *Edda* is to Iceland. The petty sovereigns who held sway in Norway in remote ages were independent, but appear to have acknowledged a kind of supremacy in the kings of Sweden and Denmark, probably more nominal than real; but until the ninth or tenth century little is known of the annals of the country. The Norwegians, of course, constituted no inconsiderable proportion of those daring adventurers who, under the general name of Normans on the continent, and Danes in Britain, became at one time the terror of all the maritime parts of Europe.⁵

The Royal Northern Antiquarian Society of Copenhagen has published a series of the *Saga*, comprehending the historical account of events which belong to European history, and also to that of Scandinavia, during the eleventh and twelfth centuries. It includes a period of about one hundred and seventy years, beginning with the *Saga* of St Olaf, the contemporary of Canute the Great of England, who assumed the crown of Norway in 1013, and continuing the series until the death of Magnus Erlingson in a sea-fight with Sverrer I. in 1184. This is one of the most

¹ Such is the opinion hazarded by Gibbon on a subject which admits of much curious speculation. The extraordinary elevation of the land in these northern regions has been fully confirmed by recent investigations.

² Lib. iv. cap. 16.

³ From *Nord*, and *theg* (way) *Norweg*.

⁴ See the articles DENMARK, FRANCE, and ENGLAND.

⁵ VOL. XVI.

³ See the article NORWEGE, in the *Dictionnaire Géographique de l'Encyclopédie*.

⁵ Malte-Brun's Geography, vol. viii. p. 517.

Norway. curious and minute pictures of an age long past, which the literature of Europe is possessed of. It is not only valuable as an historical document, confirming or adding to our stock of facts relative to a dark period of English history, but as a record of the social condition of the country at that time, and of the influence of the Thing, or assembly of the people; a reference of all matters to this popular convocation being one of the most striking facts recorded in the Saga. From these rude annals we learn, that at a period immediately preceding the first traces of free institutions in our own country, similar institutions existed in great activity amongst these northern people. It seems a fair inference from these facts, therefore, that we owe the political institutions which we enjoy to the Danes and Normans, who were more likely to impose their own peculiar institutions upon those whom they subdued, than to receive institutions from the conquered.

From other Sagas preceding that of St Olaf, we learn, that about the middle of the ninth century, Halfden the Black divided Norway into five districts, with fixed head places for holding Things in each. At these assemblies, laws were framed suitable to the local circumstances of each district, which gave its name to the code. This potentate was succeeded by the celebrated Harold Harfagr, or the Fair-Haired, who ascended the throne at ten years of age, and reigned from 863 to 936. This warlike monarch, after long fighting, reduced all the independent nobles or petty kings to the condition of subjects, and consolidated the various principalities of Norway into one kingdom. Thus was consummated in a single reign, and that too in the ninth century, a work which afterwards cost the other nations of Europe several centuries of bloodshed and contention. But this was more easily accomplished in Norway than elsewhere; for in that country the great nobility never had feudal powers, and consequently those who were under them as servants were bound by no such ties of vassalage as the retainers of a Highland chieftain or a Norman baron. They were not taught passive and unconditional submission to a superior, although he might bear the title of king; for before a small sovereign could make war, he was under the necessity of assembling the Thing, and obtaining its sanction. The equal division of property amongst children, which extended to the crown itself, prevented the accumulation of power in the hands of individuals; and the circumstance of the total want of fortresses, castles, or strongholds in the country, owing to the division of estates, effectually prevented a nobility from attaining the same power with the nobles of feudal countries, and setting the royal authority at defiance. Some of these nobility or small kings colonized Iceland; and Normandy was conquered by Rolf Gangr, one of those whom Harold Harfagr expelled from Norway. In this king's reign Christianity was introduced into the country, and from this period the events recorded in the historical Saga may claim some degree of confidence.¹ The length of this reign was no doubt favourable to the lower orders, by consolidating their institutions, which, as they weakened the authority of the petty kings, were favoured by Harold. Eric, his son and successor, whom he had associated with himself in the royal authority, was deposed by the Thing on account of his cruelty, and a younger brother succeeded him. Hakon, which was the name of this son of Harfagr, was brought up from his childhood at the court of Athelstane, king of England. He reigned nineteen years, during which period there was frequent

Norway. reference to the Things, both for amending the laws, and for the dissemination of Christianity. It appears, that in attempting to establish the religion of the Cross in his dominions, Hakon had recourse to what were considered as unconstitutional means; for we find that at a meeting of the Thing, held in the year 956, a husbandman named Asbiorn, of Medalhuus, stood up and declared, on the part of his neighbours and of himself, "that they had elected Hakon to be their king, upon the condition that freedom of religion and freedom of conscience should be warranted to every man; and if the king persisted in attempting to suppress their ancient faith, they would elect another king;" adding, "and now, king, make thy choice." This is certainly one of the most striking instances of parliamentary patriotism to be met with in the history of Europe; and we must descend six or seven centuries nearer to the present time before we can match it in the annals of our own country. Hakon was not only compelled to give way, but also to take part in the heathen ceremonies of the meeting. This king was slain in 963, in a battle with the sons of his elder brother Eric, upon whom Athelstane of England had conferred the kingdom of Northumberland.

It appears that, after the death of Harfagr, the small kings again had risen to some degree of power, and that each in his own assembly, called also a Thing, had exercised a limited authority. Olaf the saint, before he assumed the name of king, consulted one of these assemblies of the nobility as to the way of proposing his claim as heir of Harfagr to the general Things of the people; and proceeded in such a manner as to show that their voice alone was insufficient to constitute him supreme chief in the land, without the sanction of the general Thing. These institutions appear to have always conferred or confirmed the royal prerogative, and to have been of great importance in that age amongst the whole Scandinavian people. In cases where the good of the community was at stake, they set the royal authority at defiance, and obliged the sovereign to accept of such international contracts as the Things of both countries conceived was for their mutual benefit. The Thing of Sweden compelled the sovereign of that country to conclude a peace with Norway, and to bestow his daughter in marriage on King Olaf, towards whom he cherished implacable enmity. Olaf had the title of saint conferred on him from the exertions which he made to introduce Christianity amongst his subjects; but in prosecution of this object he exercised the most atrocious cruelties, and completely alienated the affections of his people. He attempted to govern without the intervention of the Things, which became the cause of his ruin; for when Canute the Great, who conquered Norway, invaded his dominions, the people literally "stopped the supplies;" and, unable to collect a force sufficient to oppose the king of England, he was compelled to seek refuge in Russia. For the purpose of recovering his crown, he landed in Sweden with a few followers, and, having received an accession to his force from the king of that country, who was his brother-in-law, marched from the Gulf of Finland across the peninsula to the Fiord or Gulf of Drontheim. In the mean time the Thing of Norway raised an army of twelve thousand bonder, and placed it under the command of Olver of Egge. At the debouche of the valley of Værdal they met Olaf at the head of about four thousand adventurers. The conflict could not be doubtful where there was such an inequality of numbers, and where the superiority lay on the side of those who were fighting in defence of their li-

¹ Harold Harfagr was born in the year 853; he began to reign in 863, and died in 936. St Olaf's father was Harold Grændske, his grandfather Gudrod, his great-grandfather Biorn Stærke, and his great-great-grandfather Harold Harfagr, and St Olaf was born anno 995, only fifty-nine years after the death of his great progenitor Harfagr. A contemporary of St Olaf was therefore a credible source of information for all the events of Harfagr's reign, such as the conquest of Normandy by Rolf Gangr, the colonization of Iceland, &c. (Laing's Journal of a Residence in Norway.)

Norway. berties. King Olaf was defeated and slain, without even showing the prudence and courage which had distinguished his early career. This battle was fought on the 31st of August 1030, and not on the 29th of June or July 1033, as is commonly stated.¹ The body of the fallen monarch was transported to Saint Clement's Church, in Drontheim, which had been erected by himself. In return for the services which he had rendered the church, the clergy soon afterwards canonized him; and even at Constantinople temples were erected to his memory. His tomb was regarded as a consecrated spot, to which pilgrimages were performed, not only by ardent devotees from the north, but also from the south of Europe.

Canute the Great did not long remain in Norway; and from the period of Olaf's death the country was ruled by native monarchs, who even for a time governed Denmark. It may be gathered from the ancient chronicles before referred to, that at this period society was composed of four distinct orders. The first was the nobility, who were descendants of royal families; and, without regard to priority of birth, those who were descended both on the mother's side and father's side from Harfagr were eligible to the supreme monarchy. They appear to have had no civil power or privilege as nobles, but merely this *odelsbaarn-ret* to the crown. The *odelsbaarnmen*, *bondermen*, or husbandmen, were the proprietors of lands held neither from the king nor from any feudal superior. These were the people who had a voice at the *Things*. A third order consisted of the unfree men, holding land for services as vassals or as labourers in cottages, but who had no voice in the *Things* in respect of their land. A fourth order was composed of the *trælle* or domestic slaves, who were private property, and in a lower state than the former class. This condition of society, which was equivalent to slavery, was abolished by Magnus VII., who reigned from 1319 to 1344.

The most important event in the history of Norway, Sweden, and Denmark, in the middle ages, was the union of the three kingdoms under one sovereign, Margaret, daughter of Waldemar, king of Denmark, which was effected by the league of Calmar, in the year 1397. The circumstances which led to this remarkable occurrence will be found narrated in the article DENMARK. Had this princess been as capable of conquering national prejudices as she was of defeating armies, her dominions would have constituted a great and powerful monarchy. But the passions of her people were more than a match for her policy; and it was no doubt better that the three nations which she governed should each remain in quiet possession of its own freedom, as enjoyed under its own form of government and laws, than that they should lay aside all differences, and, heartily uniting as one kingdom and people, become the terror and scourge of Southern Europe. Margaret died without issue; but during her lifetime she appointed her grand-nephew, whom some historians call her cousin, Eric, a descendant of the Dukes of Pomerania, as her successor; and he acceded to the triple crown of Scandinavia in 1412. The union, however, was far from being cordial, and for rather more than a century local insurrections from time to time broke out and distracted the country. The Swedes, in particular, felt great reluctance to submit to a foreign dynasty; and after various attempts on their part to shake

themselves free from the compact of Calmar, the oppression and cruelty of Christian II. led to the final separation of Sweden in 1520, under the celebrated Gustavus Erickson or Vasa. Norway and Denmark, however, remained under one sceptre till, at the adjustment of European affairs after the fall of Napoleon, Norway was separated from Denmark, and united to the crown of Sweden. This took place in the year 1814.

The circumstances which led to the forcible separation of two countries that had for centuries been united by the closest relations, and the union of one of them with another country which had for as many ages been regarded as a natural enemy, may be shortly stated. The grand object of the leading powers was to induce every state to join in the league against Napoleon; and Sweden, in consideration of an ample bribe, acceded to the general confederacy. One of the foulest stains on the escutcheon of Great Britain is the treaty which she entered into with Sweden, dated 3d March 1813. By this notorious compact against the liberties of a whole people, England gave to the king of Sweden the kingdom of Norway (which was no more hers than Rome or Pekin), together with Guadaloupe, and a million of pounds sterling, as a remuneration to his Swedish majesty for joining the allied powers against France.² After the battle of Leipsic, fought in October 1813, the Crown Prince of Sweden entered Denmark with his army, and, after some bloody scenes in Holstein, peace was concluded at Kiel on the 14th of January 1814. By this treaty Denmark gave up all right to Norway, considering it as quite hopeless to enter into a contest with Sweden and England. Although the king of Denmark might relinquish his claim to the sovereignty of Norway, this was no reason for the people of that country making an unconditional surrender of themselves to a foreign potentate. They declared themselves an independent nation, framed a constitution of their own, and proclaimed Prince Christian, son of their former sovereign, and governor of Norway, as their lawful king. Not a little blood was shed in the contention between Sweden and Norway; and England actively interfered, by blockading the ports of Norway, for the purpose of starving the inhabitants of the country into subjection. But a speedy settlement of the question became necessary to all parties. The constitution which the Norwegians had prepared in April 1814, and which they were in arms to maintain, was guaranteed to them, upon condition of their accepting along with it the Swedish monarch as king, and the Crown Prince of Denmark abdicating the throne. Matters were arranged on this footing; and on the 17th of May 1814, both parties, the king of Sweden and the Norwegian nation, solemnly entered into a compact to the effect stated, under the sanction and guarantee of the allied powers, and of Great Britain amongst the rest.³ By the treaty, the entire independence of Norway as a kingdom was secured, the crowns alone being united, as in the case of Hanover and England. She had a constitution of her own framing, a legislature of her own electing, without being interfered with by any foreign authority in the exercise of her right, and laws of her own making and administering; in short, Norway remained a pure democracy in all but the name.

Since this union of Norway and Sweden under one so-

¹ This is put beyond a doubt by a circumstance which all accounts of the battle mention, namely, that a total eclipse of the sun occurred on the same day. Professor Hansteen of Christiania has calculated that such a celestial phenomenon could only have taken place on the 31st of August 1030.

² In the article containing the accession of England to the treaty, after various mutual stipulations, there is a provision containing the following words: "And his majesty the king of Sweden engages that this union shall take place with every possible regard and consideration for the happiness and liberty of the people of Norway."

³ It is a fact worthy of being recorded, that the committee which drew up this constitution, and laid it before the national assembly, sat only four days, viz. from the 12th to the 16th of April. That so perfect a model of a free constitution should have been framed in so short a period, is truly marvellous; especially as it was not a rough, unfinished outline, but a system of government complete in all its details.

Norway.

vereign, there have occurred only two events of any importance in the history of the former. The first was the abolition of hereditary nobility by the Storting; and the second was an attempt of the Swedish cabinet in 1824 to force on the Norwegian people an entire amalgamation of their country with Sweden. But the firmness of the Storting or parliament, the honourable feelings of the sovereign, and, it is said, the interference of Russia on the part of the allied powers, prevented such an infamous attempt to violate the faith of treaties, and bring disgrace upon those who had guaranteed them. Great Britain, as a party to the treaty of 1813, and as having inflicted some injury on the country by her ships of war, was especially bound to protect the liberties and national independence of Norway, and to preserve her from becoming a mere province of Sweden, as Poland is now of Russia.

The facts relative to the abolition of hereditary nobility may be shortly stated. It is fixed that the executive power has not a final veto, but only a suspensive negative, till the law is passed by three successive Storthings. In the year 1815, both chambers of the Storting proposed and passed a motion to abolish nobility for ever in Norway. The slender remains of this class were of foreign, and almost in every instance of recent origin; besides, few of them had enough of property to enable them to hold a dignified station in society. By the law of succession land is equally divided amongst all the children, so that large estates could not be entailed on the possessor of the family title; and hence, to maintain his rank and respectability, a nobleman must have become a placeman or a pensioner, or engaged in operations which would bring nobility into contempt. The existence of an hereditary nobility, in a country where the law of primogeniture was unknown in the succession to real property, seemed, therefore, an anomaly, which, in any circumstances, could not long be tolerated, and which was altogether unsuitable to the state of things which had long obtained in Norway. The royal assent, however, was refused to the proposed enactment in 1815, and again in the year 1818, after it had passed through a second Storting. To prevent it from passing a third time became the grand object of government; for then it would necessarily have become the law of the land, with or without the royal consent. In 1821, the year when the measure was to be again brought forward, the king in person repaired to Christiania, and used every means to induce the Storting to abandon it; but in vain. Six thousand soldiers were marched to the neighbourhood of that city, to overawe both the legislature and the people, and extreme irritation prevailed. At this critical moment, when the flames of civil war were about to be kindled, both the Russian and American ministers interfered. What arguments or remonstrances they employed is unknown; but the fact is, that government lowered its tone, the troops were withdrawn, and the Swedish cabinet gave way. The Storting having passed the measure abolishing hereditary nobility for the third time, it consequently became law. Norway, therefore, remains a pure democracy, federally united with the monarchy of Sweden. Its constitution has outlived two dangerous attacks upon it; and as the principles upon which it is based have been developed by practice, it has gained additional strength, and been further secured by the love and veneration of the people. The sudden disjunction of Denmark and Norway, left, of course, much business to be adjusted between individuals of the two countries. It thus occasioned much distress and loss to persons having connections and property

in both; and it still produces a constant intercourse. Few, we believe, will admire the manner in which the union between Sweden and Norway was effected; but as few will doubt the benefits which must result to both from the exchange of mutual hostility for mutual cordiality, and to a certain extent an identity of interests.

If the reader turn to the map of Europe, he will find that Norway extends from the fifty-eighth to the seventy-first degree of north latitude, and at the broadest from the fifth to about the thirteenth degree of longitude east from Greenwich. On the east it is bounded by Sweden, on the west and south by the North Sea, and on the north by the Arctic Ocean. At the broadest part it is scarcely three hundred miles across, and north of the sixty-third degree of latitude the breadth is very inconsiderable, the country narrowing to a mere belt. Its shape is very peculiar, and, in the main, it strikingly resembles that of a Florence flask, the rounded bottom being presented to the south, and the long narrow neck stretching to the north. Norway thus begins about the point where Scotland ends, that is, the Naze. The most southerly headland in the former is nearly in the same parallel as the Pentland Frith, which divides the latter country from the Orkney Islands. These facts will serve to convey a somewhat precise idea of the position of Norway. The sea-coast presents features similar to those which characterise Iceland, the North of Scotland, Newfoundland, Nova Scotia, Labrador, and other islands and continental tracts of country exposed to the storms, the currents, and the perpetual buffetings of the Northern Ocean. The action of the sea alone, however, could not have formed such immense fissures as are found in the solid primary rock on the Norwegian coast. The theory of the elevation of the land by volcanic impulse from below seems alone sufficient to account for such phenomena.¹

The greater part of Norway may be said to have an outer and an inner coast, the former being a succession of rocky islands of all dimensions, from a mere point to more than a mile in length, and lying within about a mile of the mainland, thus circling all the coast as with a girdle. Boats and small vessels make their coasting voyages within the rocks; for, even when the ocean is strongly agitated, the outer barrier acts as a sort of break-water, preventing the channel within from being thrown into violent commotion.

Those immense arms of the sea which penetrate deep into the country are called fiords in Norway; a name in geographical nomenclature identifying them with the friths of Scotland, to which they bear a general resemblance, and also to the maritime lochs so numerous on the west coast of that country. To enumerate these were only to present a catalogue of names designating the same object in different situations and of different sizes. They vary from sixty to two hundred miles in length, and from being several miles to less than a gunshot in breadth; and altogether they constitute one of the most remarkable physical features of the country. The inland streams generally empty themselves into these fiords; and, as in the case of the Friths of Forth, Clyde, and others, in Scotland, it is often difficult to say where the river ends and the ocean begins. All along the rock-bound coast these arms of the sea succeed each other with melancholy sameness; but in penetrating within their sombre and sometimes dangerous mouths, the scene is all at once changed, presenting, at the bottom of these bays, creeks, and other indentations, towns of a pleasant and cheerful aspect, and banks finely wooded with all the va-

¹ Indeed, the large rounded boulder stones found on the tops of the highest mountains afford evidence sufficient of the fact that at one time Norway had been submerged beneath the Northern Ocean. That the sea never flowed in this quarter of the globe (and consequently in every other), eight thousand feet (the height of the highest mountains) above its present level, may readily be taken for granted. We may, therefore, conclude, that the land has been raised by some mighty power; and we know of none which could effect this but the pent-up fire and compressed gases of a volcano, which, striving for vent, upheaved the solid pavement of the globe which lay above them, and thus broke it up into innumerable fragments.

Norway. rieties of those forest trees which we are accustomed to meet in more temperate latitudes, and studded with cottages, farm-houses, and country residences, indicating taste and comfort, if not luxury and wealth. The tide rushes into many of these fiords with great violence, especially on the north-westerly quarter of the peninsula. This is readily accounted for from the fact, that the interior basins are often very capacious, whilst the mouths by which the water flows in to fill them are frequently very confined. Opposite to Folden Fiord is the Maelström, or Moskoestrom, long celebrated as the most appalling whirlpool in Europe; but it owes much of its reputation to the exaggerated accounts of travellers. It is situated nearly at the extremity of the range of the Lofoden Islands, beginning between Moskoenæs and Moskoe, and exhausting itself between Varoe and Rost, the last of which is the most westerly of the Lofodens. The whirlpool is simply caused by the rushing of the ocean, as the tide rises and falls, between this chain of islands, which impedes its course like the narrow mouths of the fiords. The relative position of the surrounding islands causes the Maelström to form a large circle; and the great inequalities of its bottom, which, from a few fathoms, deepens suddenly in many parts to 200, increase the violence of the current.

The interior of Norway is traversed by a succession of mountain ranges, called Fjeldes, whence the Cumberland term Fell, designating an elevated tract of ground. Some geographers have divided the Scandinavian Alps into groups, a classification which appears to be more fanciful than real. Those which intersect Norway, extending from the southern extremity of the country to Cape North, the most northerly point in Europe, are called the Dofrines; and the most considerable of these ranges is the Dovre Fjelde, lying between the sixty-second and sixty-third parallels of north latitude. Travellers are proverbially prone to give exaggerated descriptions of the physical features of the countries which they traverse; and from this cause our ideas of the height of the Norwegian mountains, and the sublimity of the scenery which they present, have hitherto been pitched rather above the truth. Mr Laing, in his excellent account of the country, thus describes this great natural feature of Norway. "The Dovre Fjelde here (at Jerkin, on the northern verge of the range) may be from twenty-four to twenty-eight miles across. When we give things their real names, we take away much of their imagined grandeur. The Dovre Fjelde sounds well, and we fancy it a vast and sublime natural feature. It really is no more than a *fell*, like those of Yorkshire or Cumberland; an elevated tract of ground, whence run waters in opposite directions, and which forms the base of a number of detached hills of moderate elevation. In fact, as a scene impressing the traveller with ideas of vast and lonely grandeur, the tract from the waters of the Tay to those of the Spey, by Dalnacardoch, Dalwhinny, and Pitmain, greatly surpasses it. You are indeed 3000 feet above the level of the sea; but that is not seen; it is a matter of reflection and information. You look down upon nothing below you, and look up only to hills of moderate elevation. Schneehøtte alone comes up to a mountain in magnitude: it is 7300 feet above the level of the sea; but this fell is 3000 at this farm-house (Jerkin, where Mr Laing resided), which is

Norway. about twelve miles from the base of Schneehøtte. The actual height of this mountain, therefore, for the eye, is about the same as that of Ben Nevis, about 4300 feet, with the disadvantage of gaining its apparent height by a slow rise from the fell. There is a considerable mass of snow in a hollow on the bosom of Schneehøtte, but not more than remains for great part of the summer on hills in Aberdeenshire, and nothing like a glacier.¹ The head and shoulder are clear of snow. The most remarkable feature of this mountain tract is, that the surface of the fell, and of Schneehøtte to its summit, is covered with, or more properly composed of, rounded masses of gneiss and granite, from the size of a man's head to that of the hull of a ship. These loose rolled masses are covered with soil in some places, but in others they are bare, just as they were left by the torrent which must have rounded them, and deposited them in this region."² Mr Laing was informed by one of the officers employed in the trigonometrical survey of Norway, that Schneehøtte is not the most elevated of the Norwegian mountains, and that, in all probability, Hurunger Fjelde exceeds it by about 700 feet. The names of the other elevations to the south and west of Dovre Fjelde, are Lang Fjelde, Stagen Fjelde, Sogne Fjelde, Ska-gen Fjelde, Fille Fjelde, Hardanger Fjelde, and some others which need not be named. The Hurunger, the Fille, and the Hardanger Mountains, running into the sea at the Naze of Norway, "form, with the Dovre Mountains, one vast triangular range, with its apex at Lessoe, and its base overflowed by the ocean in the height called the Shagerrak."³

There are a number of lakes in Norway, the largest of which is the Myosen, a splendid sheet of water, about eighty miles in length and from one to ten in breadth. Its scenery has been classed with the pastoral or beautiful, rather than with the sublime. Its shores are well cultivated, and, with the exception of a few rough promontories dipping into the lake, the slopes are easy, and yield fine crops of oats, bear, flax, pease, and potatoes. Its direction, like that of a great many of the lakes and rivers in Norway, is from north-west to south-east, crossing the sixty-first parallel of north latitude. The depth of the Myosen varies greatly; but it is considered as shallower than most of the other Norwegian lakes. The depth in the lower parts is not more than forty fathoms, often it is much less; but in the upper part it has been found to exceed a hundred. Yet even this is nothing in comparison with the depth of the other lakes, particularly of the Famund Soe, which is reputed to be unfathomable; a distinction always allotted to the deepest lake in every mountainous country. A large stream, called the Vormen Elv, issues from the southern limit of Lake Myosen; and at Sunde, which is its northern extremity, it forms a communication with Lake Losness, or Losness Soe, by the Lossen Elv or River, which derives its name from the lake. Into this lake flows a river which rises in the Dovre Fjelde range of mountains, and appears to be the one alluded to by Mr Laing in the following passage. "The stream which runs through Gulbrandsdal and the Myosen, and reaches the sea at Frederickstad, being the same I left at Lien, comes down from the hills at or near Lessoe, and is there divided into two branches, one of which, as above stated, runs into the Myosen, and the other into the North Sea at the fiord in

¹ Glaciers, however, are not unknown in Norway. Mr Lloyd, in his *Field Sports of the North of Europe*, observes, confirming what Mr Laing says in reference to Schneehøtte, "There were no glaciers on Schneehøtte, though such are to be found on several others of the Norwegian mountains. Justedalsbraen, or Sneebraen, as well as Folgefonden, Mr Forsell says, are the greatest glaciers in Europe." This we are inclined to consider as a great exaggeration. We learn from another authority, Mr Edward Forbes, that one of the glaciers, forming a branch of the great Folgefond, is yearly diminishing in size; a remarkable circumstance, but by no means an anomaly.

² Laing's *Residence in Norway*, p. 52-3.

³ Generally speaking, all the mountains of the Fjelde tract slope gently towards the Baltic and the north-east, whilst towards the north-west they are steep and abrupt, and in some instances almost perpendicular from the top to the bottom.

Norway. Romsdal amt, in which the town of Molde is situated, thus including in its delta between four and five degrees of latitude, and all the west and south of Norway. The course of this little river from Lessøe to the sea is very important, as it gives precision to our ideas of the shape and direction of the Dovre Fjelde, and its connection with the Hurunger, the Fille, and the Hardanger Mountains." This river must therefore have a course of probably one hundred miles in a north-westerly, and above two hundred and fifty in a south-easterly direction. It is in several parts of its course of considerable breadth, and at more than one hundred miles from its embouchure is described as a large dark-coloured and rapid river. A still larger stream is the Glommen, called by way of distinction Stor Elven, or the Great River, from its being the largest in Norway. It rises in the government of Drontheim, not far from Ovesund Lake, through which it runs; and it afterwards traverses the extensive government of Christiania, flowing through Osterdaelen and Hedemarken, passing Kongsvinger, and finally falling into the sea at Frederickstad, after a course of not less than three hundred miles, all in Norway. From the heart of this continent it opens an easy communication with the ocean, and through its means the produce of the interior is brought down to the coast. At about two hundred miles from the sea it is described as a fine majestic stream, two hundred yards in breadth. Navigation, however, is obstructed by numerous falls, one of which, not far from its mouth, is called the cataract of Sarpen, the roar of which is heard at a great distance. There are other falls on the same river; but the most stupendous natural phenomenon of this description is situated upon the opposite side of the mountain range, on streams which flow into the North Sea. Mr Lloyd¹ describes the falls of Rinkanos and Voringfos as particularly grand, the first having a perpendicular descent of 450 feet, and the second of 900 feet, the body of water in both cases being very considerable. Mr Forsell, in giving some statistical information regarding Norway, mentions other falls even more stupendous than these. There are many other lakes and rivers in Norway besides those which we have described, amongst which we may mention the Torris Elv, called the Odderen Elv during part of its upper course, a large stream, which enters the sea at Christiansand; the Topdals, which falls into the sea near the same place; the Louven Elv, which rises in the Hardanger Fjelde, traverses several long, narrow lakes, passes through Kongsberg, and enters the sea near Nauvig, in latitude 59°; and between this stream and the Lossen, which lies considerably to the north-east, there is more than one large river. A multitude of streams also run into the North Sea. The most important of these is the Namsen, which, from its exit out of the lakes that give rise to it, has a course of about ninety miles. From the ground sloping with more rapidity upon this side of the mountain chain than on the other, the water-courses must be considerably steeper. "Few countries in the world," says the traveller just mentioned, "present such sublime natural scenery; its numerous lakes and rivers, its magnificent cataracts, its boundless forests and solitary wilds, where silence seems to brood eternally, its terrific precipices, its smiling valleys, and its towering alps covered with everlasting snows, impress the mind of the traveller always with admiration, and often with awe."² The forests of Norway, as is well known, are large and numerous; but they do not appear to be so extensive as those of Sweden. In the southern parts of Norway, indeed, and up as far as Drontheim, the supplies of timber are very considerable;

but to the north of the latter place, and along the sea-coast, Norway, as well as on the mountain ranges, wood is not plentiful, many parts of the country being perfectly destitute of it. Norway, however, from the district of Drontheim southwards, may be considered as a country abundantly supplied with gigantic forests of magnificent trees, amongst which the pine, birch, and aspen, are the most celebrated and the most valuable to the inhabitants.

The prevailing rocks found in Norway belong to the primitive and transition series. The west coast is wholly composed of primitive rocks, gneiss and mica slate greatly predominating. Secondary rocks occur but rarely, and alluvial deposits are not so abundant as in many other less extensive regions. Contrary to the general belief of geologists, granite is but a rare rock. When it appears, it is frequently in veins traversing the primitive stratified rocks, or running parallel with beds or strata; and sometimes it is found spread over the surface of mica slate, as at Forvig; or irregularly associated with clay slate and diallage rock, as in the island of Mageroe. But by far the most abundant rock in Norway is gneiss, all the others of the primitive series appearing to be subordinate to it. Extensive tracts of country, and long mountain ranges, seem to consist almost entirely of gneiss. In some parts it abounds in veins of rose and milk quartz, in iron ores, in garnets, sometimes the precious, but most frequently the common garnet, and other minerals. Mica slate, however, which rests upon and alternates with the gneiss, is far from being so generally distributed, as is also the case with the clay slate. In some places steatite occurs in beds, and is quarried in slabs to be used for different purposes. Quartz rock, various hornblende rocks, and limestone, occur in beds subordinate to the gneiss and mica slate. One side of the valley of Shalheim, situated between Bergen and Sognefiord, is bounded by hills of snow-white quartz, which are almost bare, and present mural precipices, having a very singular appearance at a distance, from their shining-white colour. Gabbro or diallage rock occurs in great quantities, connected with clay slate, in the island of Mageroe, and in other parts of Norway. The class of transition rocks contains, besides graywacke, alum, slate, limestone (combined with some tremolite), and other rocks well known to mineralogists as belonging to the following series:—1. Granite, which sometimes contains hornblende; 2. syenite, which contains a beautiful Labrador variety of common felspar, and numerous crystals of the gem named zircon; 3. porphyry, and associated with it various trap-rocks allied to basalt and amygdaloid.³ All the mountains, and especially those of the south, contain a great number of minerals sought after in collections, and of metals valuable to man, amongst which may be mentioned gold, silver, iron, copper, cobalt, and others. The mines of silver in Norway are situated at Kongsberg, but although they once afforded rich returns, they now scarcely repay the labour bestowed on them. Large masses of native silver have been found here, one of them, now in the Museum of Copenhagen, weighing upwards of five hundred pounds. The Kongsberg mines abound with mineralogical curiosities, of which the most remarkable is native electrum, a natural alloy of gold and silver.⁴ There is a gold mine at Edswold, in the district of Rommarge, and mines of lead and silver in that of Jarlsberg; but they have not been wrought to any extent. The copper mines of Norway are chiefly situated in the northern division of the kingdom. The most considerable are those of Raeraas, which were discovered in 1644, at the base of the Dovre Fjelde Mountains. The

¹ Field Sports of the North of Europe, vol. ii. p. 295.

² Professor Jameson in Murray's Geography, p. 768; and a communication from Mr Forbes.

³ Elliot's Letters from the North of Europe, p. 103.

⁴ Ibid. p. 293.

Norway. other copper mines are from fifteen to twenty leagues from Drontheim, at Quikne, Laekken, Selboe, and in the district of Christiania at Fredericksgrave or Foledel. The principal iron mines are situated in Southern Norway; and of these the most distinguished are those of Arundal and Krageroe. The mines of Arundal are celebrated for the richness of their mineralogical treasures. Many of these are rare, such as botryolite, datholite, wernerite, scapolite, and moroxite; besides abundance of epidote, actinolite, cocolite, and colophonite. The ore (magnetic iron ore) is found in beds of gneiss, of which the country is chiefly formed. The mine of Laurwig, in the vicinity of the town of that name, affords annually 26,000 quintals of bar iron, and 6000 quintals of cast iron. The establishment of the same kind at Moss affords annually 10,000 quintals of bar and cast iron. Other mines, situated in various parts of the country, likewise yield large quantities of this valuable metal; and the whole produce of the Norwegian mines has been estimated at about 150,000 quintals annually. The mines of cobalt, which are worked at Modum and Fossum, are extensive, but not very deep. There is a mine of plumbago and black lead at Engledal. The mines of alum, which are worked in the mountain of Egeberg, near to Christiania, afford not only a sufficiency for the consumption of the Danish states, but some for exportation. Norway possesses quarries of granite, marble, millstone, whetstone, slate, and clay. Granite is exported to Holland, and marble and other minerals to Denmark.

Norway possesses an island called Berend Island, situated between Spitzbergen and North Cape, which presents some interesting features to the geologist. It is about thirty English miles in circumference, and is composed of a formation totally different from the primary rocks of which the Norwegian peninsula, and, it is understood, Spitzbergen, and other polar islands, consist. The whole island appears to be one entire mass of coal. It is not the fossil-wood brown coal, or surturbund, found in Iceland, Germany, and some parts of the west of England, but mineral coal. Quantities of it have been brought to the mainland by vessels sent to hunt the white bear and the walrus, which abound in the icy region where Berend Island is situated.

Ancient
lakes, &c.

Some valleys in Norway give abundant indications of their having been lakes of fresh water, which were either gradually drained as the land became elevated, or, bursting the barriers that confined them, suddenly laid their basins dry. Mr Laing describes one of these in the following passage. "On ascending the steep which bound the flat alluvial bottom of the valley on each side, and which consists generally of banks of gravelly soil, one is surprised to find a kind of upper terrace of excellent land, cultivated and inhabited like the bottom, and consisting of the same soil, a friable loam. This terrace rests against the primary rocks of the Fjelde, which are here limestone, marble, and gneiss, or rock of the micaceous family, of which the laminæ are singularly twisted and contorted; and the terrace has evidently been the bottom of an ancient lake which has been bounded by these Fjelde ridges." The same traveller gives an account of one of these ancient sea-beaches, which, in other countries besides Norway, are calculated to arrest the attention and excite the wonder of the observer of nature. He is speaking of the Snaasen Vand, a lake some sixty or seventy miles north from Drontheim. "About seven miles inland from the present sea strand, at the head of the fiord, and about sixty feet above the present high-water level, there is an ancient sea-beach of a very remarkable character. Above the house of Fossum, and forty feet higher than the lake of that name, the sea-shells are so abundant that they might be applied to agricultural purposes, and they lie close to the surface." At another place in the neighbourhood there is a large

bed of shells, which have been used in mending the road for a considerable distance towards Snaasen Vand. "They are entire; the upper and under ones of the mussel, cockle, and clam are united, and the mussels grouped together, as in the living state; so that this bed has clearly been the spot upon which the animals lived." From these and other indications, it is concluded, that a shore in a direction nearly parallel to that of the present one of the Drontheim Gulf, and on a level at least sixty feet higher, has existed at a recent geological period. These beds are not covered with any thickness of decayed vegetable soil, and the shells retain in part their natural hue and enamel. The land, therefore, has been elevated at no very distant period; at what rate per century has not been determined as to this side; but the Swedish philosophers assert, that the change of level in the Gulf of Finland is at the rate of four feet and a half in a hundred years. Such could not have been the case on the shores of Norway washed by the North Sea; for the relative position of known points upon the line of the sea-shore, to the present level of the sea, are by historical evidence ascertained to have changed little if any during a thousand years. The change of level may have been local, or it may have gone on more rapidly at one time than at another.

Earthquakes have been repeatedly experienced in Norway, at least seven having occurred within the last forty years. History records one which occurred at Drontheim on the 18th of July 1686, and another on the 1st of April 1692. On the 14th of September 1344, the river Guul disappeared in the earth; and on its bursting out again, destroyed forty-eight farms, and 250 human beings. About the same time a great earthquake took place in Iceland. Indeed the whole aspect of this country bears evidence to the fact, that at some period, or more probably at different periods, its surface has been elevated, depressed, and shattered by great convulsions.

It would occupy too much space to enumerate in detail Botany. the characteristic plants of Norway. The vegetation of the west coast is very similar to that of Britain, but in the south and east there is found a completely different Flora, approximating to that of Denmark and Germany. The cause of the remarkable difference between the Flora, and also the Fauna, of the two coasts, is probably to be referred to the absence of tides on the south coast. This circumstance seems to exercise an important influence on the character of the natural productions of the country; and we the more especially refer to it, as it seems to have been hitherto entirely overlooked by naturalists. At Bergen the tide falls six or eight feet, but on the south coast it does not fall six inches.

The animal kingdom of Norway requires some notice. Zoology. As population has increased, the wild animals have of course gradually disappeared, and the bear and the wolf are no longer the terror of the traveller, as they were wont to be. In winter, indeed, they may sometimes be found in disagreeable proximity to a stranger who intrudes within their range; but they are in general timid, and only formidable in herds. In Norway the bear retires to his den, which is generally some sheltered hole in the rocks of the Fjelde, in November, and remains in a state of inactivity, without food, it is said, until April. Indeed many of the smaller animals, the field-mice, the lemmings, and, Mr Laing conjectures, many of the birds, pass the winter in this climate in a state of occasional torpidity. The wolves are not so dangerous animals as those of the south of Europe. They rarely attack a man, but they will carry off a dog at his side; and they often commit serious havoc amongst the domestic animals. The loss of sheep, calves, cows, and foals, in certain parishes, during the season when they are at pasture, is sometimes immense. Bears also commit depredations of the same kind, but not nearly to the same ex-

Norway. tent, as the wolf, which, when he gets into a herd, bites and tears all that he can overtake. The elk is now very rarely to be met with, and in all likelihood will soon disappear from this part of Europe. It is described as a magnificent animal, being often seventeen hands in height, and sometimes exceeding in size the largest horse. But such splendid specimens are now seldom or never seen. During winter it resides chiefly in hilly woods; but in summer it frequents swamps and the borders of lakes, often going deep into the water to escape the stings of gnats and other insects, and to feed without stooping. With its enormous horns it turns down with great dexterity branches of trees, in order to feed upon the bark; and these are also used as shovels to get at pasture when it is covered with snow. The glutton or wolverine, so called in America, is reckoned a Norwegian animal. Its total length is not more than two feet and a half, and it flies from the face of man. It feeds chiefly upon beasts which have been accidentally killed; but it will hunt small animals, such as meadow-mice, marmots, and the like, and occasionally attack disabled animals of a large size. Although not fleet, it is very industrious, and does great injury to the small fur trade in the northern parts of Europe. The rein-deer, which is found in considerable numbers on the Hardanger Fjelde and the Sogne Fjelde, and the diversified qualities of which are so beautifully adapted to the bleak and inhospitable regions in the north of Norway, will be found described in the article LAPLAND. The beaver, although not extinct, is rare, and lives solitary, not, like the American beaver, in society. A particular kind of dog, with a remarkably fine, soft, and glossy fur, is bred for its skin, which is made into pelisses for winter wear. Besides the wild and tame rein-deer, red deer are pretty numerous in some districts. The fox and the lemming are abundant in some parts, particularly in the north. A multitude of birds inhabit the coasts of the ocean, and Norway furnishes a considerable part of the eider-down, so well known to the luxurious in couches. Game is plentiful; the principal birds being called the tydder, roer, ryper, and jerper. The tydder is the bird known of old in Scotland by the name of capercaillie, but now extinct. The cock is a noble bird, of the size of a turkey-cock, with a bill and claws of great strength. The roer is the female, and in size, plumage, and appearance so different from the male, that it has received a different name in the language. The ryper is the same as the Scottish ptarmigan, but larger and better clothed. Its flavour, however, is inferior to the game of the Scottish hills. But the jerper is a more delicate bird for the table than any of our game. It is of the grouse species, and about the size of a full-grown pigeon. The silence of the forest solitudes is occasionally broken by the sweep of the eagle's or the heron's wing; but the traveller in Norway is generally struck with the limited number of small birds which he meets in the course of his ramblings. Magpies, the Royston crow, and swallows, are common; but the lark, linnet, thrush, blackbird, robin, and some others common to Great Britain, are little known here. Hares and squirrels are in considerable abundance; and there are some other quadrupeds and birds no strangers to the country, but they are of too little importance to require any particular mention. Amongst domestic animals may be mentioned the horse, goat, sheep, and cow; the goose, the duck, and the turkey, which are also found wild. Of horses there is a small breed very general in Norway, and another of a larger size, which is much esteemed for its swiftness and sureness of foot. "These Norwegian horse are beyond all praise," says Mr Laing; "they scamper down hills as steep as a house roof, and in going up hill actually scramble. They have no

objection whatever, if you have none, to any path or any pace; they are the bravest of horse kind." They are fed entirely upon hay, which, although merely withered grass, appears to be more substantial than ours, from the wind and powers of the horses which live upon nothing else. The sheep are shaped like deer, having long legs and small muzzles. Numbers of goats and cows are kept, the milk which they yield being very rich, and highly esteemed. Fish abound in the seas, lakes, and rivers of Norway; and the inhabitants not only derive a considerable portion of their subsistence from fishing, but it also forms an important article of export. Amongst the insects of Norway, the gnat, or rather mosquito, is found exceedingly annoying. They are in greatest abundance and most venomous in the north. The *furia infernalis*, so called from the dreadful effects which follow from its bite, frequents the marshes or boggy grounds. The acute pain and inflammatory swelling which its bite produces are removed by a curd poultice, which is said to be an infallible cure. The entomology of the south of Norway is very similar to that of the south of England, whilst that of the west resembles the entomology of Scotland.

From the general elevation of the land, the climate is of course rendered more severe than would naturally be- long to a country under the same parallel the general elevation of which was more nearly on a level with the ocean. The winters are long and very cold; but, as in all northern climates, their length and severity are in some measure compensated by the great heat, and consequently rapid vegetation, in summer. Towards the east, and in the interior, the winter is longest, the cold, generally speaking, always increasing towards the north. The effects of the sea-breezes upon the general temperature of the coasts of all countries are well known. Winter, however, is very pleasant and salubrious; for although the air is cold, it is dry and bracing, not damp and raw. But the western part, especially about Bergen and along the coast, is proverbially rainy, owing probably to the high mountains, which attract the clouds wafted from the ocean. But the country behind this barrier is on that account particularly dry, perhaps somewhat too much so. In Norway the weather is in general more steady than in Britain; it is either good or bad for considerable periods. The summer season is delightful, and very warm. In narrow glens it is too hot during the middle of the day; but the morning, evening, and midnight hours are charming, and peculiar to this country. The sun is below the horizon for so short a time that the sky retains the glow and the air the warmth and dryness, which are as grateful to the eye as they are pleasing to the feelings. Summer lingers long in this country; and, in general, it is an unbroken series of beautiful days. The disagreeable season is the spring, April and May, when, in the transition from winter to summer, the snows are suddenly melted, and the ground is rendered uncomfortable for travelling. Damage is sometimes done by the rapid swelling of the torrents and rivers. When the white covering of winter disappears, vegetation bursts forth at once, and advances with astonishing rapidity. The following account of the climate of Norway, divided into several districts, is abridged from a popular book of travels.¹ From latitude 58° to 59° the average temperature is about 45° of Fahrenheit, and there is no constant snow region; between 59° and 60° the average temperature is 44°; and between 60° and 61° it is 43° on the sea-coast and 41° in the interior. The mountains of the Hardanger Fjelde and Fille Fjelde lie within this division, and also the great Lake Myosen. From 61° to 62° the average temperature is 40°; a degree farther north

¹ Journey through Norway, Sweden, and Denmark, by H. D. Inglis, p. 262-5.

Norway. the heat is about a degree less; and of course it continues to decrease as we proceed towards the North Cape.

The luxuriance of vegetation being abridged by the length and severity of the winter, the soil is thus indirectly rendered comparatively sterile. In America the immense forests are continually enriching the mould with their decaying foliage; but in Norway the paucity of alluvial tracts, the prevalence of rock, seldom far beneath, and often forming the surface, together with the want of vegetable decomposition, materially detract from the quantity as well as the quality of the soil. In some parts it is very rich; and the valleys, in particular, are celebrated for their luxuriant fertility. But much of the soil is thin, and obstructed by rocky knobs rising above its surface, and interfering with the labours of the husbandman. "I have not, indeed," says Mr Laing, "seen in Norway twenty acres of arable land in one field, without some obstruction from knobs of stone." Excepting in the extreme northerly divisions of the country, agriculture is prosecuted with considerable spirit and success.

Natural
produc-
tions.

"In Norway," says Mr Laing, "the trees of the pine tribe are called furu and gran. Furu is our pine (*pinus silvestris*), and gran is our fir (*pinus abies*); the one is the red wood and the other the white wood of our carpenters. There are whole districts which produce only furu, others only gran; and this seems not exactly regulated by latitude or elevation. The zones at which different trees cease to grow appear to be a theory to which the exceptions are as numerous as the examples. In Romsdal amt, at Fanne Fiord, near Molde, in latitude 62° 47' north, and with a medium temperature of only 4° of Reaumur (41° of Fahrenheit), pears, the bergamot, gravenstein, and imperial, and also plums, come to perfection; and the walnut-tree often bears ripe fruit. Hazel and elm in the same amt form continuous woods, as at Egerdal. Yet the gran disappears altogether, although in the same degree of latitude it grows at an elevation of 1000 feet above the sea in the interior of Norway, and even in latitude 69° in Lapmark. It has been found a vain attempt to raise it in Romsdal amt, a locality in which the following trees and bushes grow readily; Canadian poplar, balsam poplar, horse-chestnut, larch, elder, yew, roses of various sorts, lavender, box, laburnum, white thorn, and ivy. Larch brought from Scotland appears to thrive. There must be something in the nature of the plants not connected with elevation or latitude that determines the growth of the gran and furu." Mr Laing mentions instances sufficiently striking to prove that the "theory of the zones of elevation at which different species of trees will or will not grow must be taken with caution, as it does not satisfactorily cover all the facts observable in this country." In another place he observes, that "wood of considerable size grows as far north as the valley of the Namsen, the largest of the Norwegian rivers, about 120 miles from Drontheim. It grows in sheltered situations in Nordland and Finmark, as far north as Alten Fiord (latitude 70°), but of diminutive size, and in such limited quantity that it is thought necessary to preserve it for the use of the inhabitants, and its exportation is prohibited." Trees in the valley of the Namsen are large enough for building material and the masts of ships. In another place Mr Laing says, "I did not expect certainly to be charmed with the crops in the sixty-fifth degree of north latitude; but the vegetative power, whatever be the cause, is more vigorous here than in the north of Scotland. Some of the largest establishments of saw-mills in Norway are supplied with trees from the forests around the Snaasen Vand. Of ordinary productions, as rye, oats, bear, flax, hops, there appeared to be great crops. This may well be in a soil and climate which raises such noble forests. Behind the house I inhabited is a standard cherry-tree bearing ripe fruit. It would be a rarity in

Scotland to raise them unless against a wall, even eight degrees of latitude south of this." Here Mr Laing found hops cultivated as a crop, whilst flax ripened so as to be fit for seed. The mountain and common ash are here scarce; the aspen, wild cherry, birch, and the pine tribes, being the trees, and the juniper, wild raspberry, and wild rose, the bushes, which generally prevail.

Taking the river Namsen as a boundary line separating the productive from the unproductive part of Norway, the country lying to the south of it may be considered as capable of producing, in favourable situations, the grains and fruits of England, and these, too, often in the highest degree of perfection. Most kinds of fruit are abundant, but the greatest favourite is the cherry. The crop of cherries is scarcely ever known to fail; and in proof of the abundance of this fruit, it may be mentioned, that the Norwegians preserve it in great quantities, and use it in many culinary operations. Amongst the fruits growing wild are strawberries, raspberries, cloudberry, cranberries, and various other kinds of berries. The three first mentioned are considered as delicious, and they are eaten both when freshly gathered, like cultivated strawberries, and after being preserved.

The principal products of the Norwegian farm are oats, rye, wheat, bear, hops, flax, a kind of bearded spring grain, with potatoes; and a large portion of every farm is set apart to grow grass for the cattle and horses. The grass for the most part is natural, sown grasses for hay being very little cultivated. The land, after a bear crop following potatoes, is left to sward itself with natural grasses for four years, and to form the hay land, so that the proportion of grass to arable land is much greater than in our farms. The natural grasses do not attain any length, and they are shaven as close to the ground as a bowling-green. The fields are not what is called top-dressed, as with us. The scythe in use is much shorter in the blade than that of Great Britain, and it answers the purpose much better. Potatoes, which appear to occupy the place of turnips with us, have been much cultivated since 1812 and 1814, when bad crops, together with the war then raging, reduced many to the use of bark-bread. Large quantities of spirits, called Norwegian brandy, are distilled from potatoes. A small enclosure for hops is attached to every farm-house; but carrots, onions, cabbage, and all garden vegetables, are little used. Probably the short interval between winter and summer allows little time for attending to any but the essential crops. The hop flourishes with little attention under the sixty-fourth parallel; a striking fact, when we consider that this plant is delicate and precarious in the south of England. But there are doubtless families of plants, as there are races of animals, more hardy, or at least more exempt from disease, than others of the same species, and thus enabled to endure the rigours of a stern climate. In farming operations, ditching, draining, and clearing land of vegetable and other obstructions, are prosecuted with great spirit and success. Agriculturists are continually adding to the quantity of arable land in the country by thus redeeming the soil from its original wild state. However, from causes already mentioned, Norway is not capable of furnishing the means of subsistence to any considerable population. Generally speaking, only the glens of the country are inhabited. On the dividing ridges there is little or no cultivation, and indeed no soil to cultivate, but only rounded masses of gneiss and micaceous rocks, with juniper, fir, aspen, birch, and beech, growing where they can amongst the stones.

Mr Laing gives a very minute account of a Norwegian farm rented by a Scotchman; and as he considers it "fitted to be the representative of a large portion of the estates into which this country is divided," we shall abridge his description, retaining all the essential parts. Land in

Norway. Norway is measured by the mæling, which contains forty-nine square ells, the ell containing two feet, and the Norwegian foot being three per cent. longer than ours. Thus the English acre of 43,560 square feet contains four mælings and four tenths. Each farm may be considered as consisting of three divisions. The first is the infield, or what we should call the mains, or home acres, enclosed for the crops and the best hay. The next is the mark or outfield, also enclosed, and affording the out-pasture for the cattle. Parts of it are occasionally fenced off, and broken up for grain, and, when exhausted, are left to sward themselves; so that when the cattle are sent to the Fjelde in summer, some hay is got from the mark. There is often a still rougher piece of ground divided from the mark, as a range for goats and young cattle, called the out-mark. The third division is the seater. This is a pasture or grass farm often at the distance of thirty or forty miles up in the Fjelde, to which the whole of the cattle and dairy-maids are sent for three or four months in summer. The huts on these seaters are substantial buildings, with every accommodation necessary for the dairy; and butter and cheese are accordingly made in very considerable quantities. When speaking of farms of so many mælings, the seater and mark are not included in the measurement, but thrown in as appendages. "The farm of my countryman," says Mr Laing, "consists of 1276 mælings, or 290 English acres; but this does not include the seater, which happens here to be on the hills immediately behind the farm, is covered with fine trees, and is of a defined boundary, extending about a Norwegian mile (seven English miles) in circuit. On the measured land 148 acres are cleared; but, being farmed in the Norwegian style, one third only bears crops of corn and potatoes. The remainder is always in grass or hay, for the winter support of the cattle. It is natural grass, not top-dressed with manure, and is mown when not above the length of one's finger, so that the proportion of arable land that must be given up to keep the cattle in winter is enormous. It is the system of farming in this quarter; 142 acres outside of the 148 infield are half cleared, being fenced off and ploughed in patches. It bears good grass, but is encumbered in some places with brushwood and stones."

"This farm supports twenty cows, seven horses, and a score or two of sheep and goats. The accommodation for cattle is excellent. They stand in a single row in the middle of a wide house, with partitions between each, and room before and behind greater than is occupied by the animal itself. The cow-house is lighted by glass windows on each side. The cattle stand on a wooden floor, below which is a vault, into which the dung is swept by a grated opening at the end of each stall." All the cow-houses in Norway are constructed on this large and convenient scale; and neither cows nor horses require litter, which is a great saving of fodder. Besides, they are kept perfectly clean, with comparatively little trouble. The annual rent of this farm was two hundred dollars, or L.37. 10s. sterling, and the amount of taxes paid was L.6. 14s. 5s., nearly one sixth of the rental, which appears very heavy. But this is nearly all that is paid in any shape; the indirect taxes, such as our excise and custom-house duties, being inconsiderable. It includes tithe, and all charges connected with the church establishment, poor rate, and so forth. Such a property as that now described is considered worth about 4000 dollars. From 2500 to 4500 dollars include, it appears, the prices of all ordinary estates, and any thing very much above or below would be an exception to a general rule. As to the dwelling-houses on such estates, the material for building is so easily obtained that there is really no difference between the residence of a public functionary, of a clergyman, or of a gentleman of large property, and that of a bonde or pea-

sant proprietor. The Norwegians are the best lodged people in Europe, Mr Laing says; but there is little show, and no magnificence which can well be dispensed with in such a country. The division of property among children prevents the erection of splendid mansions, or any thing more expensive than is proportioned to the property upon which they stand. The harvest work in this district," continues our traveller, "and I believe all over Norway, is well done; and parts of their management might be adopted with advantage in our late districts, where so much grain is lost or damaged almost every autumn by wind or rain. For every ten sheaves, a pole of light strong wood, about the thickness of the handle of a garden rake, and about nine feet in length, is fixed in the ground by an iron-shod borer; it costs here almost nothing. A man sets two sheaves on the ground against the stem, and impales all the rest upon the pole, one above the other, with the heads hanging downwards." This is certainly a mode very superior to ours; and they have likewise a better way of cutting it, by which little of the grain is lost. But for an account of this process, and other farming operations, we must refer to Mr Laing's work (pp. 96, 106).

The breed of cattle in Norway is fine boned, thin skinned, and kindly looking; the colour is generally white, sometimes mixed with red, but seldom entirely black. The head and muzzle are as fine as in our Devonshire breed. There is so little coarseness about the head or neck of the bull, that the difference between him and the ox is less observable than in our breeds. The cattle are all very carefully attended to, and form an important branch of the husbandry, as dairy produce enters much into the food of every family, and is more certain in this climate than that of grain. The cows, sheep, and goats are more tame and docile than they are in Britain, from the constant care and attendance bestowed on them during the long period which they must stand within doors; and the Norwegians are remarkably kind to their domestic animals. Goats are a favourite stock, and on every farm appear to be much more numerous than sheep. The goat will eat and thrive on the shoots of the dwarf birch, beech, and young fir; but the sheep will not, and in winter it requires some hay. The goat then gets a bundle of dried leaves and shoots of the beech, which only cost the trouble of collecting and drying them. Every farmhouse at this season is surrounded with bundles of these withered branches and leaves of beech tied together, and stuck upon poles to dry. The goat, too, gives some milk in winter, when that of cows is scarce; and from the uncommon richness of milk in Norway, this small quantity can bear to be increased with water, without materially deteriorating it.

Irrigation is carried on in many parts to an extent quite unknown in this country. Hay being the principal winter support of live stock, and both it and corn, as well as potatoes, being liable, from the shallow soil and powerful reflection of sunshine from the rocks, to be burned and withered up, the greatest exertions are made to bring water from the head of each glen, along such a level as will give the command of it to each farmer at the head of his fields. This is done by conducting water in troughs made of the half of a tree roughly scooped out, from the highest perennial stream amongst the hills, through woods, across ravines, along the rocky and often perpendicular sides of the glens; and from this main trough lateral branches shoot off to each farm. The farmer distributes this supply by moveable troughs amongst his fields, watering each rig successively. The quantity of land traversed by these artificial water-courses is very great.

In winter, when agricultural operations are suspended, the Norwegian employs himself in making all the imple-

Norway. ments, furniture, and clothing, which his family may require; thrashing out the crop, attending to the cattle, distilling his potatoes, brewing, driving about to fairs, or paying visits. The heaviest of his occupations is driving wood out of the forests, or bog-hay from the Fjelde, where it is made in summer by those who attend the cattle. The distillation of spirits from potatoes is general throughout Norway, grain not being in such abundance as to allow of its consumption in this way. By far the greater part of the spirits used in the country is made in families, not in regular distilleries; every common bonde, or peasant proprietor, distilling his own few barrels. It is part of the women's work, like cheese-making or brewing, and is carried on once a week or once a fortnight, on every gaard, for the sake of the wash and refuse to the cattle, as well as for the spirits. The most profitable way of distilling potatoes," says Mr Laing, "is with a mixture of crushed wheat and malt, or, instead of wheat, rye or any other kind of grain. The best proportions are these:—To six heaped barrels of potatoes, weighing seventy-eight stones of sixteen pounds each, nine and a half stones of wheat or other corn, and five of malt from bear or big. If more of any of the parts be taken, the wort or liquor to be distilled is too heavy, and is apt to burn or singe in the still. By this proportion the smallest distilling, as a barrel or half a barrel at a time, is regulated. The crushed grain and malt are first mixed in about a hundred and twenty quarts of water, heated to 50° of Reaumur, or 144° of Fahrenheit, and no higher. The potatoes being perfectly steamed (brought to such a state as to be fit for eating), are crushed between two rollers, and, as they leave the rollers, are shovelled into the vat in which the fermentation is to take place." "Boiling water to the extent of about four hundred and fifty quarts is then poured into the vat, and is cooled down with cold water to 20° Reaumur, or 77° Fahrenheit, at which the mash of wheat and malt is added to it; the vat is then immediately covered up as tightly as possible, and left to ferment." After fermentation has ceased, distillation immediately commences, the process being conducted in the usual way. Somewhat more than eighteen quarts English, of a strong fiery spirit, destitute of any disagreeable taste or smell, is produced from the barrel of potatoes. Of its exact strength Mr Laing was unable to form any judgment.

In Norway there is no restriction on mills, every man who chooses having a right to erect one, without entailing upon himself any feudal burden, such as service, suit, or feu, for he is the superior of his own lands. These mills are very numerous in the country, being not only necessary to almost every farm, but for sawing timber for exportation, as well as for home consumption.

The thrashing machines in general use amongst agriculturists are similar in construction to those of Scotland; and some have grinding machinery attached to them. There is an institution of a very peculiar nature, which is quite common all over Norway. In this country there are no merchants equivalent to our corn-dealers, nor are there any weekly markets held for the sale of grain. There are no middle-men between the grower and the consumer, and any surplus grain which the farmer may have is stored up in what may be called corn-magazines, which are just large warehouses erected in various parts of the country, as the necessities of the inhabitants require them. What grain the farmer thinks he will not require he conveys in sledges to these places, and for every eight bushels which he deposits, he receives nine at the end of twelve months; in short, he lays it out at interest, and has an increase of one eighth per annum. If, however, he has none deposited, or overdraws, he pays for the quantity received in loan at the rate of one fourth of increase per annum; so that for every eight bushels which he takes he pays back

Norway. ten at the end of twelve months, or at that rate for whatever time he may have the loan. This is, in fact, a savings' bank for corn, and is probably the most ancient of these institutions. There being no corn-merchants is decidedly a material check upon the prosperity of agriculture; for, from the want of a ready market where he might dispose of his produce, and the consequent comparatively small inducement which he has to store it up in these magazines, the farmer naturally wastes it, or does what is probably worse, distils it into ardent spirits. But these institutions are exceedingly useful to the Norwegians as they are circumstanced; and were it not for them, many might be placed in great difficulties, for want of seed or bread when a bad season disappointed their hopes of a supply from their own fields. The small profit which occurs upon these transactions defrays the necessary expenses of building and keeping up the magazines, which are entirely under the management of the bonder or peasant proprietors. However, under such a system, husbandry can never become what it is in Great Britain, a manufacture of corn, beef, and other provisions, carried on by a class of individuals who pay a very high rent for the premises on which they work, and embark large capitals in the business. In Norway the bulk of the farmers have no rent to pay, the property being their own; the articles which their farms produce constitute nearly the whole of the food or raiment which they and their people require; and there are not, as in other countries, considerable masses of population in towns and villages, who, not being producers of food themselves, must obtain it from those who are; so that the farmer is less dependent upon money-bringing crops than is the case with us. If he raise what is sufficient for his own household consumption, with a little surplus for sale to pay the taxes, and for the purchase of a few luxuries, all the purposes of farming are served with him. This is partly owing to the state of property in Norway.

Property in Norway is held by what is called the udal ^{State of} or odel system of rights, not from any superior, not even ^{property.} from the king, but, as the possessors proudly express it, by the same right by which the crown itself is held; consequently there is no acknowledgment, real or nominal, as feu-duty or reddendo, paid. In this country all lands are theoretically said to be held from the king; and, according to Sir Edward Coke, we have no allodial lands. In Norway estates are allodial, the absolute property of the owner; they are therefore possessed without charter, and are subject to none of the burdens and casualties affecting land held by feudal tenure direct from the sovereign, or from his superior vassal. There is, in short, a total negation of the feudal principle; there is neither superior nor vassal, so that the military service which the latter paid to the former in consideration of the land which was granted appears never to have existed in Norway; and as this constituted the foundation of the law of primogeniture, so, where such service was entirely unknown, there was no necessity for that law, which consequently remained equally unknown. In all feudal countries the eldest male heir has to pay an acknowledgment to the feudal superior on his entering as vassal in the land. But udal, or noble land, as the word signifies, not being held for military service to a superior, no *delectus personæ* as to who should inherit it was competent to any authority, and consequently no preference of the eldest male heir could grow into the law of succession to land. Hence the land came to be equally divided amongst all the surviving children, male and female. There appears, however, to be a species of entail connected with the udal tenure. If the udalman in possession should alienate to a stranger, the next of kin has a right of redemption on paying the price of the land. This is called the Odelbaarn's Ret, and all the kindred of the udalman in possession

Norway. are what is called Odelsbaarn to his land, or, in other words, have a certain right in the order of consanguinity. By recent enactments, this right of redemption has been limited in its exercise to a period of five years; and it is provided that all improvements, as well as the original price, must be paid for.

The equal partition of property amongst children by the udal tenure has prevented the accumulation of property in large masses; but, as might have been expected by theorists, it has not led to subdivisions of estates to an injurious extent. "The division of the land appears not," says Mr Laing, "during the thousand years it has been in operation, to have had the effect of reducing the landed properties to the minimum size that will barely support human existence. I have counted from five and twenty to forty cows upon farms, and that in a country in which the farmer must, for at least seven months in the year, have winter-houses and provender provided for all the cattle. It is evident that some cause or other, operating on aggregation of landed property, counteracts the dividing effects of partition among children." In another place Mr Laing says, "The estates of individuals are generally small; and the houses, furniture, food, comfort, ways and means of living, among all classes, appear to me to approach more nearly to an equality to one standard than in any country in Europe. This standard is far removed from any want or discomfort on one hand, or any luxury or display on the other. The actual partition of the land itself seems, in practice, not to go below such a portion of land as will support a family comfortably, according to the habits and notions of the country; and it is indeed evident that a piece of ground without houses upon it, and too small to keep a family according to the national estimation of what is requisite, would be of no value as a separate property. The heirs accordingly either sell to each other, or sell the whole to a stranger, and divide the proceeds. The duty of the Sorenskriver, or district judge, consists chiefly in arranging this kind of chancery business, and all debts and deeds affecting property are registered with him."

The cause which, according to Mr Laing, has prevented excessive subdivision, is, "that in a country where land is held, not in tenantry merely, as in Ireland, but in full ownership, its aggregation by the deaths of co-heirs and by the marriages of female heirs among the body of landowners, will balance its subdivision by the equal succession of children." This is undoubtedly true, and, when taken in connection with other facts, may sufficiently explain the case. Mr Laing informs us that the standard of living is high in Norway; or that the population is much better clothed, lodged, fed, and generally provided for, than our labouring and middling classes in the south of Scotland. The dwelling-houses of the meanest labourers are divided into several apartments, and have wooden floors and a sufficient number of good windows, with some kind of out-house for cattle and lumber. Their food and clothing are equally good and substantial. Now it seems quite clear that a people habituated to such a standard of subsistence and comfort will not only not suffer their condition to sink indefinitely below it, but, by prudence and foresight in the contraction of marriage and the raising of a family, will keep down their numbers considerably within their means of subsistence. In Norway that condition which secures respectability to a common man, is one in which he commands not only all the comforts, but most of the luxuries of life, common to the country; and the natural desire of all mankind to keep up caste, to maintain themselves in that station in which they were born, not to decline from it, and fall, as it were, out of the ranks, will operate as a most powerful check upon the minute subdivision of land. There are other causes in operation to which our circumscribed limits will only admit of our ad-

verting. These are the ancient and confirmed habits of Norway. the people, which may be taken into account as a corollary of the preceding proposition; and the absence of impediments, such as fines on alienation, or imposts of any kind, in the way of sale or conveyance. Where such fines exist, the difficulties of re-uniting land which has been subdivided are great and annoying. But in Norway, when an udalman dies, the co-heirs do not break up the estate left to them into six or eight, or any other number of estates, corresponding to the number of children; which would at once reduce the standard of living of the whole of them below that to which they were accustomed. They appear either to sell to each other, which is easily effected in the absence of fines and other burdens on conveyance of property; or they make a joint-stock business of it, till circumstances permit some of the members to dispose of their shares to those who may remain, and employ the capital in such an advantageous manner as will secure them in that comparative independence and affluence to which they were all their lives accustomed. The diffusion of property in Norway is no doubt very great, compared with its diffusion in this country, but not as compared with Canada. The following table will facilitate comparison:

Country.	Population.	Proprietors.	Proportion of Proprietors to Population.
Scotland.....	2,093,456	8,961	1 to 222
Norway.....	910,000	41,656	1 to 22
Lower Canada..	512,000	57,891	1 to 9

These small estates are scattered on the sides of glens, lakes, and fiords, over a vast extent of country, and, generally speaking, are situated at great distances from towns.

There are two classes of landholders in Norway; those who have farms larger than they themselves can cultivate, and those who exclusively farm their own estates. These constitute the bulk of the population. The first are called proprietors, a sort of conventional term, equivalent to our esquire; the smaller landholders who work upon their own estates are called *bonder*, a term, as appears, nearly equivalent to *feuar* in Scotland. The incomes of the former seldom exceed eight hundred or nine hundred dollars, although there are some who possess as much as three or four thousand pounds sterling per annum. The Norwegian valleys are crowded with *bonder* farms, which are very numerous throughout the country, and, with their look of plenty and completeness, may compete with the richest and most beautiful in Scotland. Mr Laing draws a very pleasing and interesting picture of this class of people, whose comfort and happiness may indeed be inferred from a short statement of facts. They are owners of their own little estates, which produce all the necessities of life, and afford a surplus for the payment of taxes and the purchase of luxuries. They have no feu-duty nor other incumbrance on their property, except the scot or land-tax, which, although heavy, renders every thing used by a family so much cheaper, the indirect taxes being little or nothing. They are exceedingly well lodged, and the families live abundantly; the manner of living, indeed, is pretty much the same amongst all classes. These, and the comfortable assurance, that in case of death the udalman leaves his wife and family provided for, are certainly calculated materially to promote human happiness. "This class," says Mr Laing, "are the kernel of the nation. They are in general fine athletic men, as their properties are not so large as to exempt them from work; but large enough to afford them and their households abundance, and even a superfluity, of the best food."

Norway.

Besides the bonder or agricultural class, properly so called, who occupy all the most fertile lands in the country "from the shore-side to the hill foot," whereon corn will grow, there is another class called Fjelde bonder, who form a connecting link, as it were, between the class above described and the wandering Laplander. They also possess land, and have houses, which, although small, are comfortable; but being above the level of the corn growing country, their situation is not so favourable, nor is their condition equal to that of the other small proprietors. The Fjelde bonder are "the hewers of wood and drawers of water" in Norway; but they still possess property in cattle as well as in land, and they are described as extremely hardy and active, and as having more robust frames than the agricultural bonder. There is yet another class of the population, which is altogether distinct from any of the preceding, consisting entirely of fishermen, whose social condition must be considerably inferior to that of the others.

Fishing.

In the provinces of Nordland and Finmark, which occupy the northern part of Norway, beyond the river Namsen, agriculture is but a secondary business, and fishing may be said to occupy most of the attention of the inhabitants. The crops of grain are too inconsiderable and precarious to afford them the means of subsistence, and the riches of the deep are brought in as a compensation for the poverty of the land. The winter fishery in the Lofoden Islands, from the middle of February to the middle of April, and the summer fishery over all the coast, which in some branch or other gives employment for the remainder of the year, furnish the inhabitants with the means of purchasing the necessaries which they require. The fish trade is a very curious monopoly. It does not belong to Norway as a whole, but is in the possession of Bergen, Drontheim, Christiansand, and one or two other towns of minor note. Those who manage the business as merchants or shop-keepers, are licensed burgesses of these towns; and each has a certain tract of coast or circle belonging to his shop or factory, within which no other person is entitled to buy or sell. These privileged traders pay a certain tax, and are besides obliged to receive and entertain travellers; and their exclusive privilege has become hereditary, attached to the house or factory in which it may be exercised by a duly privileged trader. The average value of the winter fishery has been estimated at L.86,500 sterling; and as the number of inhabitants in the two provinces is only about 80,000, the trade of Nordland and Finmark with the rest of Norway is at the rate of little more than twenty shillings a head. The merchants send out vessels furnished with articles required in the country, and receive the produce of their eight weeks' fishery in payment. In fact, these distant provinces are connected with the rest of the country for just two months in the year, and that only through a few merchants in two or three towns. During the other ten months the trade is left entirely in the hands of the Russians, who feed the population, and receive in return all that their industry produces in the fishing. The privileged Norwegians take no more brandy, colonial produce, or such other articles as are wanted, than what is sufficient to pay the persons who fish for them for eight weeks; their further supplies the inhabitants obtain from Russia. Were the trade free to all the natives of Norway, as it is in every country where trade has flourished, there would have been a body of Norwegian traders to and from these provinces, carrying on every branch in which employment and profit could be found and realized. Instead of this, the business is almost entirely in the hands of strangers, and Norway receives little or no benefit from her own possessions. To the absurdity of such a monopoly it would be difficult to find a parallel in the history of commercial restrictions.

Norway.

The fishing business itself is conducted in a peculiar manner. Every twenty or thirty of the fishing companies have a yacht, or large tender, which conveys the provisions, nets, lines, and other articles, to the Lofoden Islands, the great scene of the Norwegian fishery, and brings back the produce. The stations are all correctly defined by marks on the coast, and by judicious regulations confining line-fishers to the inside, and net-fishers to the outside. In 1827, which was a medium year, there were 2916 boats fishing in eighty-three different stations, accompanied by 124 yachts or tenders, the number of men employed being 15,324 in all. The produce was 16,456,620 fish, which would amount to about 8800 tons dried; there were also 21,530 barrels of cod oil, and 6000 of cod roe. When this fishing ends, the seafaring peasantry of this part of the country, as we have already said, are employed by the Russians; the others return to their homes, and catch sethe (*gadus virens*) or herrings. The herring fishery is very judiciously managed; so much so, indeed, that the Norwegians have beaten the Scotch herring curers out of the markets of the Baltic, as they deliver fish better assorted, and of superior quality. Besides these important general fisheries, there is in every creek of the fiords, even at a hundred miles up from the ocean, abundance of cod, whittings, haddocks, flounders, sea-bream, and herrings, caught for daily use and for sale by the seafaring peasantry. The rivers and lakes are likewise well supplied with fish, which may indeed be said to constitute the basis of a Norwegian repast.

The manufactures of Norway are too unimportant to detain us long. Wood and fish are the chief produce of the country; and these find their way to every part of Europe, chiefly in Norwegian vessels, which in return bring home whatever foreign articles are required, at the cheapest possible rate of freight. The import duties are very moderate. Articles which have been in use, and are not intended for sale, as furniture, books, clothes, or household goods, are not subject to duty. Before the importer pays his duties, he is allowed to take his goods to his own warehouse and shop, upon giving security for the amount of the duties ascertained by the custom-house officers at landing; he also keeps an account of his sales, and pays the duty every three months upon the quantity which appears to have been sold. This must be of great advantage to the dealer in a country so poor as Norway, since it leaves his capital entirely free for active employment. Coffee, sugar, tea, a little French brandy, and French and Spanish wines, a little tobacco, (for the Norwegians smoke less than any other continental people), and a limited quantity of spices, are the principal articles for which the house-keeper has to disburse money. The other necessaries of life are produced by themselves. Shoes, furniture, cloths, and the like, are all made at home. Looms are at work in every house in the country; carding, spinning, and weaving forming constant occupations of the female part of the household. Woolen cloth, substantial but coarse, excellent bed and table linen, and checked or striped cotton or linen for female apparel, are the ordinary fabrics produced. These home-made stuffs, including boots, gloves, and in bad weather great-coats, clothe the greater part of the inhabitants, and more comfortably than is the case with the lower and middling classes of people in most other countries. The upper ranks, or the people of condition, dress as in other parts of Europe; and as living and lodging are nearly on a level amongst all the respectable classes, the peasant proprietor, and those more wealthy than he is, this wearing of foreign articles by the latter, and home-made stuffs by the former, would seem to constitute a kind of conventional distinction between them. This is not the place to speculate on the general economy of these family manufactures; it seems, however, to be extremely well adapted to the Norwegians,

Trade and
manufac-
tures.

Norway. as they are circumstanced, both in regard to climate and social relationship.

The principal articles of export are timber, bark, iron, copper, fish, and some others. The principal articles of import are corn, colonial produce, woollen, linen, and cotton goods, wine, brandy, &c. Salted and pickled fish, one of the staple products of Norway, is principally exported from Bergen. In the year 1833, there were exported from this place, of dried fish or stock fish, 22,620,992 pounds, and of salted and dried fish 4,802,000 pounds. The deals of Christiania have always been held in the highest estimation; a consequence of the excellence of the timber, and of the care with which the sap-wood and other defective parts are cut away. Like many other branches of the trade of Norway, that of preparing wood was formerly fettered by pernicious restrictions; the saw-mills being licensed to cut a certain quantity only, and the proprietors bound to make oath that it was not exceeded. But this absurd regulation no longer exists. British manufactured goods are admitted into Norway on moderate duties, and are very generally made use of. The imports from Norway were,

	In 1831.	In 1835.
Bark for tanning and dyeing...	48,131 cwts.....	20,043 cwts.
Iron	377 tons.....	4 tons.
Goat-skins.....	18,219 number....	7,837 number.
Smalts	206,840 lbs.....	90,563 lbs.
Battens and batten ends.....	8,439 grt. hund..	5,415 grt. hund.
Deal and deal ends.....	10,457 do. do....	4,704 do. do.
Masts, yards, and the like, } under twelve inches.....	4,826 do. do....	6,842 do. do.
Timber.....	23,527 loads.....	30,446 loads.

These are the principal articles; but there were some others, amongst which may be reckoned one million of lobsters. The exports to Norway were,

	In 1831.	In 1835.
Coffee	535,491 lbs.....	310,459 lbs.
Indigo	7,765 lbs.....	8,631 lbs.
Pepper	8,189 lbs.....	1,920 lbs.
Pimento.....	4,981 lbs.....	4,348 lbs.
Rum.....	4,585 galls.....	6,248 galls.
Muscovado sugar.....	3,169 cwts.....	1,298 cwts.
Tobacco.....	366,024 lbs.....	475,338 lbs.
Cotton wool.....	83,566 lbs.....	39,227 lbs.
Coal.....	3,774 tons.....	5,602 tons.
Cotton cloth.....	434,744 yards.....	691,320 yards.
Earthenware.....	L.3,402	L.4,502
Cutlery.....	L.2,648	L.3,646
Soap and candles.....	L.2,938	L.3,302
Woollens.....	L.13,000	L.17,229
Salt.....	92,150 bushels.....	147,057 bush.
Wheat .....	.....	1,283 qrs.
Barley.....	.....	24,471 qrs.

In some articles our trade with Norway has declined, but the amount of British and Irish produce and manufacture exported to that country has steadily increased, as the following statement will show. Our exports were, in 1827, L.39,129; in 1828, L.53,582; in 1829, L.64,234; in 1830, L.63,926; in 1831, L.58,580; in 1832, L.34,528; in 1833, L.55,038; in 1834, L.61,998; and in 1835, L.79,278.

Were the discriminating duty on Norwegian and Baltic timber repealed, our commercial relations with the whole north of Europe would be greatly extended. Compared with the Swedish customs-duties, those of Norway are moderate, the import duties seldom exceeding two per cent. *ad valorem*. In 1831 they amounted to L.161,840 inwards, and to L.47,381 outwards, making in all L.209,221. To these should be added L.27,436 received on account of tonnage duties, lights, and sundries. The weights and measures of Norway are the same as those of Denmark,

With regard to money, the principal silver coin in circulation (for there are none of gold) is called a species dollar, which is divided into one hundred and twenty skilling. There are also half species, one fifth species, one fifteenth species, and what is denominated skillemynt or small change, that is, four and two skilling pieces of silver, and also one and two skilling pieces of copper. The dollar is worth three shillings and tenpence sterling at the present rate of exchange (1837). There are, besides, notes of one dollar, half a dollar, and twenty-four skilling, all printed on white paper. The notes of five dollars value are on blue paper, those of ten dollars on yellow paper, and those of fifty on green paper. This is, we think, a very wise and convenient arrangement.

The Norwegian finances are in a flourishing condition, the revenue having latterly increased considerably. The Bank of Norway, which was founded in 1816, has its head office in Drontheim, with branches in the principal towns, and is under the direction of five stockholders, with a council of fifteen representatives of the other proprietors. The transactions of this bank are conducted upon a principle totally opposite to that of the Scotch and other banking establishments. It is there considered as a first principle that the bank should hold only available securities, as bills or bonds at a short date, or payable at a short notice, for its issues or advances. The national bank of Norway is therefore a bank for landed property, and discounts mercantile bills and personal securities only as a secondary branch. Its chief business is advancing its own notes, upon first securities over land, any sum not exceeding two thirds of the value of the property, according to a general valuation made in the year 1812. The borrower pays four per cent. for what he draws, and is bound to pay also five per cent. of the principal yearly. This kind of bank is exceedingly well adapted for the wants of the country; and their paper can scarcely be considered as less secure than their silver. Since it commenced business, discussions have more than once taken place regarding the return of the bank to cash payments, as it was originally agreed that after the lapse of a certain period it should begin to pay its notes in cash. This has not been found practicable, although the maximum has been reduced to 125 paper dollars for 100 of silver; but the paper dollar has for a considerable time been at 112 for 100 silver on the exchange of Hamburg. The bank is able to provide for all its notes in silver; and the question recently agitated in the Storthing was, whether its course of 125 paper for 100 silver dollars should not now be reduced to par, 100 paper for 100 silver, which has not been agreed upon.

The Norwegian army consists of some twelve thousand troops of all arms, besides which there are thirty thousand militia enrolled. Two companies belonging to each regiment in the Norwegian service are trained to the use of the skidor or skate. This corps, called the skielöbere, move with singular agility and speed, and, whilst skating along with the greatest velocity, perform their military evolutions with uncommon precision. The army is at the disposal of the king, as far as its services can be rendered available in Scandinavia; it cannot, however, be sent beyond the limits of the peninsula without the special permission of the Storthing. The king has the nomination of the superior officers of the army, as well as of some few of the first civil officers under the government; that of others rests with the Storthing. Norway is governed by a viceroy, appointed by the king of Sweden; Christiania, the capital of the country, being the seat of government. She contributes nothing towards the expense of the Swedish government beyond a trifling annual allowance to the royal family; but she supports all her own civil and military institutions.

Norway.

Revenue.

Army.

Norway.
Popula-
tion.

In the year 1825 the population of Norway amounted to 967,959. According to the census of 1835, it was 1,098,291, being an increase of 130,332 in ten years. The town population of 1825 was 112,778, and in 1835, 125,139, being an increase of 12,361 in the same period; and that of the country amounted in 1825 to 855,181, and in 1835 to 973,152, being an increase in ten years of 117,971. It is quite clear, therefore, that the great bulk of the population is engaged in agricultural pursuits; trade, manufactures, and the other occupations employing but a very limited number. The town population is confined to thirty-eight places, only nine of which have more than 3000 inhabitants, and only two reach 20,000. Besides, in the whole of these, with the single exception of Bergen, a considerable proportion of the inhabitants are partially engaged in agriculture. During these ten years, no manufacture has been produced fit to be exchanged for the commodities of other countries. The staple trade in wood, which formerly gave employment to a large portion of the inhabitants, has latterly been in a very depressed state, from the restrictive duty already referred to. The increase of population, therefore, has chiefly taken place amongst the agricultural classes; and the additional food raised for their support, together with the admitted advance of the people during these ten years, is to be attributed partly to additional tracts of land having been taken in, and partly to improved methods of cultivating the old soil. The country has unquestionably made great progress under its own peculiar legislation; and taxes have gradually been reduced.

Political
divisions.

The kingdom of Norway is divided into four sees or stifts, each of which is divided into a certain number of districts, corresponding to its size and importance, and these again into parishes, of which there are 336 in the country. The dioceses are Aggershuus, containing Christiania, the capital; Christiansand, the largest town in which bears the same name; Bergen, containing the large and important city of the same name; and Drontheim, which contains the city of Drontheim, situated on the south shore of a great fiord of the same name; the northern territories of Nordland and Finmark, which goes also by the name of Drontheim, being presumed to be in the same see. The stifts are thus distributed. Christiansand occupies the southern extremity of the country; Bergen and Aggershuus occupy the former the western, and the latter the eastern side of Norway, where it is widest, extending over its whole breadth in that quarter, and being separated by the great mountain chain; still farther north lies Drontheim, which is succeeded by Nordland and Finmark, the most northerly region of Norway, and of which the reader will find some account in the article LAPLAND. Each district, called a fogderie or bailiwick, is under a foged, who has charge of the collection of taxes, police, and all executive functions in his district. Besides this public functionary, there are military officers, who have official residences in the district; and the amtman, and sorenskriver or judge ordinary. Christiania, Bergen, Drontheim, and the other large towns in Norway, will be found described each under its own respective head in this work.

Political
constitu-
tion.

The Norwegians enjoy more political liberty than any other European nation. The parliament, called the Storting, is chosen by the owners or life-renters of the land who have attained the age of twenty-five years complete. The minimum value which gives a vote is a hundred and fifty dollars, or L.30, a value which, from the large diffusion of property, renders the suffrage nearly universal. To render the elector himself eligible as a representative, it is only necessary that he should be thirty years of age, have resided ten years in Norway, and be altogether unconnected with the state. The voters choose electing men, one to every fifty voters in towns, and one to every hundred vo-

ters in counties. The elective franchise is not connected with the place, but with the number of electors; and expands or contracts as they increase or diminish. If numbers change, the power of choosing electing men changes also; and as the Storting bears a proportion to the number of electing men, the number composing the Storting likewise varies; but the variation cannot be great, indeed seldom more than two or three. By this self-acting system of parliamentary reform, places which increase obtain a direct voice in the making of laws, whilst such as decrease below fifty electors must join another district. The electing men, on a day fixed by law, choose their representatives, and the body thus elected forms the Storting. The proportions of members chosen is founded on the principle, that the towns in Norway should as nearly as possible return one third, and the country two thirds, of the whole body, which must not consist of less than seventy-five, nor of more than one hundred members. Each district elects as many substitutes as it elects representatives, to provide against death and other casualties. The Storting is chosen every three years, and is assembled only once in three years, when it sits for three months, or until the business be despatched. The 1st of February is the day of meeting fixed by law. An extraordinary Storting may be convened by the king, but its acts must be confirmed by the next regular Storting. After some preliminary business, such as electing a president, speaker, and secretary, the Storting divides itself into two chambers. One fourth of its whole number is formed into a second chamber, called a Lagthing, or division, in which the deliberative functions of the legislative body are vested. This chamber appears to be equivalent to a house of peers, but its powers are much more confined. No bill can be introduced there; it must come from the other house, which is called the Odelsting, or house of commons. The Lagthing can only deliberate upon what is sent to it, and approve, reject, or send back the bill with proposed amendments. It is also the court before which, aided by the Hoieste Ret Court, an independent branch of the state, the lower house may impeach ministers of state. As the Storting of 1836 consisted of ninety-six individuals, the Lagthing comprised twenty-four members, and the Odelsting seventy-two. Mr Laing thus speaks of the Norwegian parliament. "The Storting consists, in fact, of three houses, the Lagthing of twenty-four members, the Odelsting of seventy-two, and the entire Storting consisting of the whole ninety-six united in one house. In this latter all motions are made and discussed; and, if entertained, are referred to committees to report upon to the Storting. The report, when received back from a committee, is debated and voted upon; and if approved, a bill in terms of the report is ordered to be brought into the Odelsting. This house entertains or rejects the proposed bill, frames and discusses the enactments if it is not rejected *in toto*, and sends it up to the Lagthing or upper house, to be deliberated upon, approved, rejected, or amended." In regard to the passage of bills through these two houses, the practice of the Norwegian parliament does not differ materially from that of our own, except in the more limited functions of the Lagthing, the king having only a suspensive veto. But if a bill pass through three successive Storthings, it becomes the law of the land without the royal assent. This was exemplified in the case of the bill, already mentioned, for the abolition of hereditary nobility. The duties of the Storting need not be minutely specified; they may easily be inferred. The members are paid for their services, and no executive officer of government can sit in either house.

For legal purposes, the whole country is divided into four stifts or provinces; and these are farther subdivided into sixty-four judicial districts, each of which last compre-

Norway.

Norway. hends several prestigilds or parishes. To each of these divisions there is a distinct tribunal, with a supreme court of ultimate appeal for the whole kingdom, established at Christiania. The lowest court, which is strictly one of equity, not of law, is the court of mutual reconciliation or agreement held in every parish, and over which presides a commissioner, who is elected every three years by the householders, and holds his court once a month, receiving a small fee. Every case or law-suit whatsoever must pass through this preliminary court, where no lawyer or attorney is permitted to practise. Each party states his own case; and if by the judgment or advice of the commissioner the parties are brought to agree, his opinion is duly registered in another court held in the parish, and it has all the validity of a final decision. If, however, the litigants are not satisfied, they carry their case to the lowest legal court, that of the *sorenskriver*, or sworn writer, which is held in every parish of every district once in every quarter. The *sorenskriver's* court is of great importance. Besides judging civil and criminal matters, it is the court of registration affecting property in the district, and also for ascertaining the value of and succession to the property of deceased persons. The court next above is the *stift-amt* court, or that of the province, and is thus constituted. It consists of three judges with assessors, is stationary in the chief town of each province, and is the court of appeal from all the lower tribunals of the province, having at the same time the revision of their administration. It must likewise sanction their decision in criminal matters before sentence can be pronounced. There is, lastly, the *Hoieste Ret* Court of final appeal. It consists of seven judges, and, by the ground law, is one of the three estates of the constitution, being independent of the executive and legislative branches. To this court appeals are carried in the last resort, from the *stift-amt* courts, in criminal as well as civil cases.

The Norwegian system of jurisprudence presents some remarkable features, not the least important of which is that the judge is responsible for his legal decision; and in a case of appeal to a higher court, he must there defend his judgment, being liable in damages for a wrong decision. This principle involves a high responsibility, and must occasion some individual annoyance, as well as expense; but it does not prevent able lawyers from becoming candidates for judicial functions; and beyond all doubt it is of great advantage to the public in giving certainty to the law, and in preventing as well as remedying erroneous decisions. The punishment of death was abolished by the Danish government about the latter end of the last century, a measure of questionable expediency in this country, at least where the secondary punishments are by no means perfect. But the punishment which is found the most effective, and which forms one of the most distinguishing characteristics of the country, is that of the "loss of honour." From the earliest times this has been a specific punishment in the criminal law of Norway, standing next in degree to the loss of life. "The possession of property," says Mr Laing, "naturally diffuses through all classes the self-respect, regard for character and public opinion, circumspection of conduct, and consideration for others, which flow from and are connected with the possession of property, and render these influential on the morals, manners, and mode of thinking of the whole body of the people." There is and has always been much more of the real business of the country in the hands of the people of Norway, and transacted by themselves, than is possessed by the inhabitants of any other European nation. Now, as the "loss of honour" involves exclusion from all the functions which naturally devolve upon them, the punishment is very severely felt, and looked upon, even by the humblest peasant, with the greatest dread. Imprison-

ment is regarded by the great bulk of the population as light compared with the sentence of dishonour; and the prevalence of such a high tone of feeling regarding a check to crime, which in other countries is altogether ineffectual, is a phenomenon in social polity highly to the credit of the Norwegians.

The Norwegian church is in principle and doctrine Lutheran, and remains as it was originally moulded after the subversion of the ancient faith, unaltered by the spirit of innovation, and unviolated by the hand of power. It is essentially ceremonial, almost as much so as the Roman Catholic. The altar is decorated with crosses and images, and the priest, arrayed in embroidered robes of velvet, celebrates high mass under that name. To maintain the ceremonial with decent splendour, as well as to support the clergyman in a respectable manner, it is necessary that the parishes should be of considerable size. There are in Norway 336 prestigilds or parishes; and many of these are exceedingly large, extending in some parts from the sea-coast to the Swedish frontier, and containing from 5000 to 10,000 inhabitants. This is certainly a low provision for religious instruction; but the people, generally speaking, are scattered all over the country, not clustered in towns and villages; and although individually they are not affluent, they are at least respectable, notwithstanding that as a whole they are poor. Under such circumstances, parishes must necessarily be large. There are five bishoprics in Norway, each of which has in it a suitable number of inferior clergymen. The patronage is in the hands of the five bishops and the Norwegian council of state, a committee of which has charge of all the affairs of the church. By judicious arrangements the abuse of patronage is prevented. Amongst the regular clergy there is one who has the superintendence over the concerns of four or five of the adjoining parishes; and the state of the church-property buildings, and the manner in which clerical duties are discharged, come under his cognizance. He communicates with the bishop of the diocese, and has a small allowance for performing these services, as dean or probst. This appears to be the only dignity in the church, with the exception of that of bishop. The incomes of the clergy are derived from tithes, commuted into a payment of grain, glebe farms, one of which the widow has for her life, offerings, and dues. These incomes in country parishes vary from 800 to 1600 dollars; but in large towns, or thickly settled parishes, they are higher. The bishops, says Mr Laing, have about four thousand dollars each. In proportion to the other professional classes in the country, the clergy are well paid, and the church has always been the first profession to which talent is naturally directed. The clergy are laborious and zealous in the discharge of their duty, the church service forming the smallest part of it. They have school examinations, Sunday schools, and other institutions for the promulgation of Christian knowledge. Mr Laing's impression is, that the Norwegian clergy are a highly educated body of men, being all acquainted with the literature of Europe, and some of them celebrated for their classical attainments. It is a peculiar characteristic of the Norwegian church, that there is no dissent from it; there are no sectarians in the country. This arises partly from the church having no temporal power, no political existence as a part of the state, no interests jarring with those of the other members of the community. In political rights and privileges the clergy are on a footing with the rest of the inhabitants, and are represented in the *Storting*, like other citizens. The Lutheran religion is part of the state, but not the ministers who teach it. One chief cause of the influence of the ministers of religion, and the absence of dissent, is the high consideration in which the right of confirmation is held. The person who has passed this ordeal is regarded as having received a moral as well as a

Norway. religious diploma, which capacitates him for an office of trust and responsibility. In connection with religion, we may mention the singular fact, that Bibles are remarkably scarce. Mr Laing could not obtain a copy of the Old or New Testament from the only bookseller in Drontheim, which contains 12,000 inhabitants, nor from the book-dealers at the fair of Levangor. The reason assigned for this remarkable deficiency in the sacred writings in a country attentive to religion, and sufficiently supplied with the catechism and the book of common prayer as used in the Norwegian church, is, that the Bible Society of London at one time sent over a great supply, and drove the regular dealers from the market by underselling them. In consequence of this they are now afraid to speculate in such a precarious stock.

Education is very generally diffused; but the standard of excellence is rather low, reading and writing constituting nearly the whole. It is provided for in the country parishes by an arrangement similar to that of Scotland. There are parochial schoolmasters, of whom some have fixed residences, and others live for one half of the year in one place, and for the other half in another. A small tax is levied from each householder, and every adult pays a small personal fee. There is a considerable degree of intelligence evinced in some of these communities; but the schools are too widely scattered over a thinly peopled country to be equally beneficial to all. It may be mentioned, that the clergy pay particular attention to the diffusion of education. The higher department of university education at Christiania is exceedingly expensive; and, besides, there is not such a demand for educated men in the medical, legal, and commercial professions, as in more densely-peopled and commercial countries, the tendency of which undoubtedly is to raise the standard of intellectual proficiency amongst all classes of the community. Those belonging to the learned professions are not numerous, because the demand is not great, and the supply is adjusted accordingly. The restrictions on the free exercise of trade and industry also operate with great force in depressing general education. Before a person can enter upon any medical or legal employment, before he can manufacture, buy, or sell as a merchant, he must obtain peculiar privileges from a corporate body. "As the expense of preparation," says Mr Laing, "and the small number of prizes to be obtained, place the higher and learned professions out of the reach of the main body of the people, as objects of rational ambition, for which they might endeavour to bestow superior education upon their children, so the restrictions and monopoly system shut them out from various paths and employments for which ingenuity, with ordinary useful education, might qualify them." With such a legislature as Norway possesses, it is to be hoped that these fetters upon the industry and intelligence of the country will not be allowed to remain much longer unre-
moved.

The press. From the general diffusion of periodical publications, Mr Laing is led to infer that the Norwegians are a reading people. What is of great importance to the community is, that the press is by law perfectly free. There is no duty on newspapers, of which upwards of twenty are published; seven or eight in Christiania alone, and all in extensive circulation. Every little town has its local newspaper; and from the importance attached to local subjects there discussed, the bulk of the community are the purchasers, not the educated few. In type and paper they are superior to the French or German papers, and much ability is shown in conducting them. "Such newspapers as the American people read," says Mr Laing, "would not find readers in this country." There is no scurrility nor personal abuse displayed by those who write in them; yet the most entire freedom of discussion exists, public men and public measures being handled

VOL. XVI.

freely but decorously, and with a strict eye to the general good. There is no tax upon advertisements; and a measure to allow all periodical publications to be transmitted free of postage was lately negatived, only because the revenue of the post-office had been appropriated to certain specific purposes for the three years next ensuing. Some newspapers which are supposed to be particularly favourable to government are allowed by royal favour to pass free of postage at present, and no doubt is entertained that ere long all will be placed upon the same footing. A number of periodical and occasional works besides newspapers are published. There are two weekly magazines in great circulation; several monthly journals devoted to literature, antiquarian, agricultural, and military subjects; and in almost every newspaper there is the announcement of some new work or translation. Yet the literature which ought strictly to be considered as Norwegian is not yet of a very high order compared with that of other countries. But the mind of the country is advancing, and literature, which is young in Norway, will advance along with it.

The inhabitants of Norway are very polite in their manners, as well to each other as to strangers. They are partial to theatrical representations, so that the drama holds a high place in their estimation; and, besides the public theatres, there are societies of amateur performers in all the larger towns, and even in some of the villages. In music, dancing, and dress, the Norwegian females are by no means deficient. They have pleasing voices, and in every family of every station singing and dancing are constantly practised in the long winter evenings. Music is taught in the country by the organist attached to each parish. In the winter regular fairs are held, at which Swedes and Laplanders attend for disposing of goods. Christmas is kept in great style, and there are other festivals and various amusements which serve to relieve the tedium of winter and spring. The 17th of May, also, being the anniversary of their independence, is celebrated both at home and abroad by every Norwegian, and with marked propriety. Mr Laing gives a favourable account of the state of morals in Norway; but, without impugning so high an authority, if we are to take bastardy as a test, the statement is not borne out by the facts. The proportion of illegitimate to legitimate children is as one to five, which is as high as in London or Paris. But the evils entailed upon society by illegitimacy are partially alleviated by the state of the law in respect to this. Children are not only rendered legitimate by the subsequent marriage of the parents, as in Scotland, but the father, previously to his contracting a marriage with another party, may, by a particular act, legitimize them. The Norwegians are at all events a very hospitable, honest, industrious, and peaceable people.

The government of Norway, aware of the value and importance of steam navigation, is making great and judicious exertions to promote it. This is a country where it is calculated to produce its greatest benefits, from the manner in which the peninsula is traversed by long arms of the sea, penetrating sometimes to its very centre. Steam-vessels are now seen plying on these fiords; they are commanded by naval officers; the fares are moderate; and in all that regards the comfort of passengers they rival our own. Roads and bridges are kept in a state of excellent order; a circumstance likely to happen in a country of proprietors, whose common interest it is to keep them in repair. There are no tolls in Norway; the principle of the farmers and others is to work in concert, and to keep up establishments for the common benefit.

The worst feature, perhaps the only thoroughly bad one, in the institutions of Norway, is, that the trade is not free. Each trade is monopolized by a sort of guild or fraternity, by which even country dealers are licensed. The pernicious effects of such a system we have sufficiently shown

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Norwich. when treating of the fisheries; and we shall close our account of this interesting country with the following observations, extracted from a work of great authority on such subjects:

"The principle of equal partition of land among all the children, retained in Norway from the earliest period, prevailed also in England before the conquest. A relic of it remains in the law of gavelkind, still existing in Kent. The different effects produced on society by the retention of that law in the one country, and its general disuse in the other, are remarkable. In Norway, chiefly by its operation, a high standard of sufficiency has been preserved among the middle and labouring classes. Population has been prevented from increasing too rapidly by the fear which people have of falling below the general standard. There has, therefore, been a continual prevalence and diffusion of ease and well-being. But, on account of the absence of great inequalities of condition, and therefore of many of the usual stimulants to exertion, society has been kept at a low level. Great social freedom has indeed always existed, in consequence of the land being in the hands of the mass of the people; but there has been a want of ability, until a very recent period, to combine for the preservation of their political independence. During their earlier history, their political liberties were often variable and uncertain. After the union of their crown with that of Denmark in 1380, it appears that the Danish

nobility gradually encroached upon their privileges; for when, in 1660, the crown and the people combined against the nobility, and abolished the states in Denmark, a similar revolution also took place in Norway; and that country continued under absolute government until the establishment of its constitution in 1814. Their udal laws trained them in the management of their own affairs, and produced that feeling of self-respect which the possession of property, and of land in particular, is calculated to give. These, together with the civil institutions preserved or introduced whilst they were under the Danish crown, prepared them for the large measure of freedom to which they have now attained. The evil of their udal system is its tendency to obstruct the development of intellect, and to keep society stationary. But since 1814 they have made great progress. Stimulants to mental activity are now no longer wanting. Their continual collision with Sweden, the problem of their internal restrictions on trade and commerce, the routine of their government, and the wholesome struggles always arising in a free state, will supply them. Their land will become more productive, by the application of science to its cultivation; their trade will also be expanded. If we open our ports to their timber, which we may one day see accomplished, their wealth will increase. And, according to the experience of the last twenty years, wealth will not materially disturb the peculiarities of their social system."¹

R. R. R.

NORWICH, a city of England, the capital of the county of Norfolk. No historical notices of the place are to be found during the period of the Roman government in this island. Its origin was during the Saxon heptarchy, when, in 446, a castle was first erected, on an elevation surrounded by water and marshes, which having become drained by natural, aided by some artificial means, gradually served as the site of the present city; its progress was slow, till Uffa, one of the kings of the East Angles, built a more solid castle in 575; and, the habitations having increased, it became the capital of the kingdom of the East Angles, which then comprehended the counties of Suffolk, Norfolk, and Cambridge.

It was captured by the Danes about an hundred years afterwards, and during the two succeeding centuries was often lost and won by that people, till Alfred the Great, in 872, had subdued those erratic conquerors, when he greatly improved the fortifications of the castle, which, having been originally of earth, he rebuilt with brick. In the reign of Ethelred, the Danes, under their king Swayne, again seized upon Norwich in 1003; but being expelled by Ethelred the next year, the city was left in a most desolate condition till 1011, when Swayne again returned, captured the castle, rebuilt the fortifications of the town, and conferred the government of it on one of his commanders, named Turkel or Turketel, who seems to have maintained himself in that post many years, and, notwithstanding occasional hostilities between the Danes and the Angles, to have contributed greatly to the advancement of the place, which was then constituted a borough. After the final expulsion of the Danes, in the latter part of the tenth century, the town increased with rapidity; much of the marshy ground was drained and built upon; and the first churches of stone were erected, some of which exist at the present time. Norwich had been created an earldom by Edward the Confessor in 1049; and in the reign of William Rufus the episcopal see was removed from Thetford, in 1094, when it became a city, but only received a char-

ter of incorporation in the reign of Henry I., in the year 1100. The chief officer was then denominated *præpositus* or provost; but in 1152, by another charter, extended still further in 1189, the title of mayor was given, and the right of the citizens to elect that officer was conferred upon them.

This city was the residence of several of our monarchs at some periods during the reigns of John, of Henry III., and of Edward I.; and the cathedral having been finished in the year 1278, the latter sovereign assisted at the solemn ceremony of its consecration.

In the year 1336 the foundation of manufactures was laid in Norwich by a colony of Dutch and Flemish weavers, who had been driven from their own country by a great inundation. The goods they made were from woollen yarn, the best spinning of which was executed first at the town of Worsted in this county, and by the name of which thread made of wool has ever since been distinguished. By this manufacture the city rapidly attained a degree of opulence before unknown, and the traces of which have continued to the present day.

King Henry III., with his Queen, Philippa, visited the city, when a grand tournament was exhibited; and they repeated their visit two years afterwards, when a new charter was granted, which extended the powers and privileges of the citizens. In 1348 the city was afflicted with that dreadful visitation known as the plague, from which, it is said, more than 57,000 persons were carried off in seven months. Before that calamity the city is said to have contained 70,000 inhabitants, having sixty-nine parish churches, and eight religious houses. But it must soon have recovered from this visitation, as it is related that, two years afterwards, a grand tournament was held, at which Edward the Black Prince was present, for whose entertainment the citizens provided a magnificent banquet, at the expense of thirty-seven pounds four shillings and sixpence.

In the year 1422 the doctrines of the reformation made their appearance in Norwich, and several persons were

¹ Edinburgh Review, No. cxxxi. p. 60.

Norwich. executed as Wickliffites, or, as they were then called, Lollards; and during the early part of the reign of Henry VII., between 1422 and 1448, many suffered severe whipping and other punishments, upon suspicion of entertaining the new opinions. These persecutions were continued at intervals till the reign of Edward VI., when, in the year 1538, the Protestant system being established by law, all the images in the cathedral and the parish churches were destroyed, and the different orders of friars and nuns in the religious houses were suppressed. On Trinity Sunday in that year the prior and monks in the cathedral changed their dresses for the habits of deans, prebends, and canons, and the Protestant worship was celebrated in it, and in all the parish churches within the city.

In 1549 this city was the theatre of a tumultuous insurrection, resembling that of the Jacquerie in France, and the peasants' war in Germany. It was at first an insurrection of the rural population, on complaints respecting the enclosure of common fields. As soon as numbers had been collected, they chose as their leaders two brothers of the name of Kett, one a tanner, the other a butcher; and on the 7th of July their numbers amounted to 16,000 men. They surrounded the city, and from thence increased their numbers to more than 20,000. Having established themselves near the city, the Ketts proclaimed themselves the king's deputies, and established a pretended court of judicature under a spreading tree, which they called the Oak of Reformation. Many gentlemen and clergymen were made prisoners by this rabble, and treated with the most barbarous cruelty. They made several attempts to force their way into the city, and succeeded in making some progress towards its reduction; but being repulsed, they, on their retreat, set fire to the houses in several places, so that some streets were consumed, and the whole city would probably have been rendered a heap of ruins, if an unusually heavy fall of rain had not checked the farther extension of the conflagration.

Whilst the insurgents still continued the siege, they were quarrelling amongst themselves, and committing the most atrocious acts of violence on the surrounding country, as well as on the persons of the gentry who were so unfortunate as to fall into their hands. They at length became masters of the city, though a small body of forces under the Marquis of Northampton had been sent to defend it. At length a more powerful body, commanded by the Earl of Warwick, made its appearance before Norwich. The first efforts of the royal troops were unsuccessful, and the rebels obtained possession of the artillery and ammunition of the Earl of Warwick, but were too ignorant of their use to improve the advantage they had gained. New troops were brought to the royal army, when a bloody attack, in which 3500 of the rebels were killed, decided the contest. A general pardon was proclaimed to all but the leaders, who were soon seized, and tried for rebellion; some were executed on the spot, but the Ketts were conveyed to London, and there convicted, but at length sent back to the place where their guilt had been incurred, and executed with great cruelty.

From the extinction of this rebellion, which, as before stated, commenced on the 7th of July, and was terminated on the 29th of August, the history of this city has nothing so peculiar as to make it an object of attention distinct from the general history of England.

Norwich is partly built upon a plain on the banks of the Wensum, a branch of the river Yare, which has been from time immemorial navigable for barges to its entrance into the sea at Yarmouth. Of late years a project has been executed for rendering this city accessible to vessels of considerable burden direct from the sea. This has been done by forming a canal ending in the lake, or, as it is provincially called, the Broad of Loathing, whence, by some

excellently-constructed flood-gates, an opening into the sea at Lowestoff has been completed. Norwich.

The city, built on the very gentle acclivity of a hill, is distinguished by one peculiarly striking feature; a large sugar-loaf hill of considerable elevation, which (whether formed by nature or by art, has been frequently a subject of dispute) stands in its centre. On the summit of that hill, towards the south-west, stood the ancient castle, of very remote but doubtful origin, though tradition, as before stated, has ascribed it to a king of the East Angles, who reigned about the year 575. It long continued strongly fortified, and, till more peaceful times have made such objects of less importance, served as the means of either protecting or overawing the city. Great alterations have been made on the level at the top of the castle hill at various periods; and, finally, since the year 1793, it is occupied with a pile of buildings as nearly resembling the architecture of the old castle as could be adapted to the purposes for which it is now used. Though the outside has a heavy and indeed gloomy appearance, the interior is appropriated with great judgment and taste as a county jail, a county hall, and an apartment for holding general county meetings.

As this castle hill covers a large space, and as the streets either converge from or wind round it, those in the vicinity, which are the scenes of the greatest activity, are both narrow and crooked, and have rather a gloomy appearance. This is indeed in some measure relieved by an extensive market-place, a large open oblong square, said to be the finest in England. This market is most abundantly supplied with provisions of all kinds, and of the best description, on Wednesdays and Saturdays. The spots for the different articles are kept separated into those for meat, for fish, for vegetables, and for poultry, butter, eggs, &c. The houses which surround the market-place are lofty and elegant, many of them have been recently new-fronted, and some rebuilt, and most of them are occupied by well-embellished shops. In the front of these shops, what is called the Gentleman's Walk was the first part of the city paved with flag-stones, and was long the chief promenade in the city.

At the northern corner of the market stands the guild-hall, an ancient and large building constructed of black flint, with cornices, window-frames, and battlements of Portland stone. The assizes for the city and the county of the city are held in an appropriate apartment of this edifice, as well as the elections of members of parliament and other elective functionaries. The upper part of the building is a room supported by fluted pillars of the Corinthian order, designed for the justices of the peace of the city, having the mayor's council-chamber within it, with a large and two small windows of beautiful stained glass. It is adorned with portraits of former distinguished members of the corporation, and more especially by a naval trophy presented by Lord Nelson, containing, in a glass case, the sword of the Spanish admiral, delivered up to that hero at the great victory gained near Cape St Vincent on the 14th of February 1797.

St Andrew's Hall, a public building, chiefly used for the social meetings of the corporation, or other public bodies, is an ancient foundation; but in its present state it is a regular and beautiful structure, consisting of a nave and two side aisles, more than fifty yards in length and thirty in breadth. It is adorned with some portraits of former magistrates by eminent artists, set in elegant frames, carved with great labour, and highly gilded. Under the gallery, at the west end, is suspended the ensign of the French ship *Genereux*, presented by Sir Edward Berry, the brave captain of the *Foudroyant*, in the year 1800. Amongst the paintings in the edifice is a fine full-length of Lord Nelson, and two historical pictures by Martin, a native of the city;

Norwich. one representing the story of Edward and Elenora, the other the execution of Lady Jane Grey. The Dutch congregation have the right of assembling here on Sunday for public worship.

The most prominent public edifices in this city are those for ecclesiastical purposes. The first of them is the cathedral, a venerable pile, one of the finest remains of Saxon architecture in this country. This building was originally erected under a Bishop Herbert, in the year 1069; and it has undergone various alterations and improvements at subsequent periods up to the present time. It is 400 feet in length, from the entrance door at the west to the east end. The west front is handsome and uniform; and the upper part is ornamented with four turrets of stone-work, and one large and two small doors. Over the centre door is a large Gothic window, extending the whole breadth and depth of the nave. The two transepts extend in length about 180 feet from north to south. The north front is ornamented with two pinnacles of stone, and over the middle door is a carved figure of Bishop Herbert, the founder. The south front has likewise two pinnacles of stone, between which, in the pediment of the roof, is a handsome dial. The interior, on entering the west front, exhibits a very pleasing appearance, arising from the uniformity and the neatness of the building, having a space of 204 feet to the entrance of the choir, which is fifty-four feet wide and seventy in height. The roof is of stone, supported by two rows of massive pillars, and is curiously arched, and carved full of small figures representing many passages of history from the Old and the New Testament. These figures are in a state of good preservation, although they have existed ever since the year 1463. The roofs of the north and south transepts also exhibit the same kind of curious workmanship. The whole of the roofs are highly esteemed by the curious, and it is said they are the only carvings of this kind that have existed so long, and been so perfectly preserved. The roof of the chancel is eighty-four feet high, and the arches and carved figures in it are very curious. The choir is spacious and beautiful; the stalls of the dean, of the vicar, archdeacons, prebendaries, and canons, as well as the bishop's throne and the chancellor's seat, are of Gothic carved work; and near them a temporary pulpit is placed for the weekly preacher. At the east end of the choir are four painted windows, the lowest representing the transfiguration, and the other some of the apostles, evangelists, and prophets. In the body of the cathedral are a number of monuments to the memory of distinguished ecclesiastics who have filled the different offices connected with this church. The tower rises in the centre of the building, at the meeting of the four roofs. The ceiling is there 100 feet in height, and the tower rises 140 feet above that. The outside is adorned with curious Gothic carved work, and is crowned with a battlement and four small spires. From the battlement a spire rises sixty-four feet, thus making the cross and weathercock at the apex 306 feet from the ground. From the low spot upon which it stands, it is not, however, a conspicuous object at a distance.

The cloisters adjoining to the cathedral excite much attention. It consists of the largest and most beautiful quadrangle in England, and was built in the year 1279. It is about 174 feet square, each of the four sides being twelve feet wide; the arches are Gothic, and the windows were once furnished with painted glass. The roof is full of historical figures, the subjects being taken from the gospel, the Revelations, and ecclesiastical history; and it is upwards of fifteen feet in height. At the south-west corner are two lavatories, ornamented with curiously carved work, representing the inveterate antipathy borne by the monks towards the secular clergy. The roofs contain no less than 418 historical figures.

The bishop's palace is a vast pile of building, very an-

tique, but modernised in some degree at subsequent, and in the greatest degree in comparatively modern times. The principal entrance is through a large and ancient gateway, with an ornamented Gothic arch. The only object within deserving of notice is the chapel, a neat and spacious edifice of white stone, most neatly fitted up. The whole precinct of the cathedral is surrounded with a lofty stone wall, except on the eastern side, where it is bounded by the river.

The parish churches are more numerous here than in any other place in England, excepting the metropolis. Few of them deserve notice; some of them are small, and several of them but a few years ago were covered with thatch. The whole number is thirty-eight. One of the oldest, and by far the largest, is that of St Peter's Mancroft. It is a fine building, 180 feet in length and sixty feet in height, with north and south aisles each 120 feet long. The inside is much admired for the lightness of its construction, the slenderness of its pillars, and the number and size of its windows. It contains many, and some remarkably fine, monuments. In the tower is a ring of twelve musical bells put up by a voluntary subscription of the parishioners in 1775. They vary regularly in weight from six hundred-weights three quarters five pounds, to forty-one hundred-weights one quarter four pounds, weighing together nine tons four hundredweights twenty-four pounds. They are highly harmonious, and are commonly rung on festivals and holidays.

Besides these numerous churches, there are places of worship for two foreign congregations of Protestants, two Roman Catholic chapels, two Quakers' meeting-houses, and chapels for each grade of dissenters from the Socinians to the Huntingtonians.

The city is well supplied with benevolent institutions for the relief of distress. Bethel Hospital, for lunatics, is endowed; St Giles Hospital, an ancient establishment, provides for a hundred poor, equally divided between males and females; Doughty's Hospital, from the name of the founder, supports twenty-four aged men and eight women; the Girls' Hospital, united with the Boys' Hospital, and with an altered establishment, provides for a large number of both sexes, both in clothing and in maintenance; the Infirmary is supported chiefly by parochial assessments; the Asylum for Indigent Blind was opened in 1805, by the beneficence of an individual, and the aid of voluntary contributions; Cook's Hospital provides for ten aged females; and the Norwich Dispensary, founded in 1804, provides the poor with medicine and medical advice gratis. The voluntary associations for purposes of beneficence are the following, besides some of a private nature, viz. the Humane Society, for recovering persons apparently drowned; the Friendly Society, for the benefit of women in old age or sickness, administered by ladies, who distribute a large sum annually; the Friars' Society, which dispenses to the industrious poor; the charity for clergymen's widows; the Benevolent Association, which has for its object the relief of decayed tradesmen; the Norfolk Benevolent Medical Society, and the Amicable Society of Attorneys, which relieve the distressed members and families of their respective professions; and the Society of Good-Will, which aids those who are not entitled to any parochial relief.

Amongst charities for educating the poor, the St George's Company, an old institution of the year 1700, must be noticed. It is chiefly supported by voluntary contributions, and educates some hundred boys and girls, who attend public worship in six parish churches. Almost every one of the various dissenting congregations has either Sunday or daily schools attached to their respective places of divine service.

One establishment, although supported by and extended to the whole county of Norfolk, is the County Hospital, with-

Norwich.

Norwich. out St Stephen's gate, erected in 1772, but enlarged at a subsequent period. A great number of patients are continually admitted and relieved by this excellent institution. The most eminent medical men attend daily, and the hospital is at all times open for accidental cases.

For objects of amusement, Norwich has an assembly-room, a neat building, erected in 1756; and a theatre, considered as one of the most complete in the kingdom out of London, in which a company perform a few months in every year.

The population of Norwich in 1801 amounted to 35,252, in 1811 to 35,338, in 1821 to 50,190, and in 1831 to 61,110. But there are portions of some of the parishes beyond the boundaries of the city, though forming part of the suburbs. Thus, in 1831, the parish of Hellesdon contained sixty-one inhabitants beyond the city boundaries, St James' had 1669, and Thorpe had 940; thus making the population at that period amount to 63,770. As the increase up to the present time has been as great as in the preceding ten years, the population at the present time, 1837, must exceed 70,000 persons.

Norwich has been the seat of manufacturing industry from a very early period, the commencement of which has been remarked in the historical notices of this article. The long disturbances in the Netherlands, and the persecutions under the Duke of Alva in particular, produced immigrations from thence in greater number, and much more important, than those which had preceded that period; and the immigrants received the greatest protection from the government of Queen Elizabeth. The goods fabricated by these people were chiefly of wool; but some were made from flax and from hemp. The woollens received appropriate names, the exact significations of which are now nearly lost. Soon afterwards a peculiar fabric was produced, from a mixture of silk or of mohair with the wool. This gave a great impulse to the trade, and produced a considerable demand for the great markets of Frankfort, Leipzig, and others in the north, and for Spain, Portugal, and Italy in the south. At the beginning of the eighteenth century, about the year 1720, this trade was at its zenith. Almost the whole female population of Norfolk and Suffolk was employed at the spinning wheel; and though 50,000 tons of wool were used, it was found necessary to draw supplies of yarn from other districts. The establishment of manufactures in Yorkshire, where coals, provisions, and labour were cheaper than in Norfolk, gave a heavy blow to the trade of the city; which would have been more severely felt, but for the fluctuations of fashion having created a greater demand for bombazines, an article which had been early made there, but had at first languished. The Yorkshire workmen, and the substitution of machinery for female hands, reduced the making of the ancient kinds of goods to a low point; and that was chiefly maintained by the East India Company purchasing annually a very large quantity of camblots for the China market. During the period from 1700 to 1800, the population of Norwich declined till towards the end of the century, when some new manufactures, and a great revival in the bombazine trade, gave an impulse, the effect of which has continued with increased force to the present day. The introduction of the shawl manufactory, one of the chief causes of the present prosperity, took place about the end of the last century; and the fabric has gradually improved till it has almost supplied the whole trade of the kingdom, besides furnishing much for foreign markets. Besides this trade, and the making of bombazines, there are some of silk goods produced, and smaller manufactures of cotton and hempen linen. The malting is a considerable trade; and the corn market, from the easy connection with London through Yarmouth or Lowestoff, is one of the most extensive in the kingdom. It appears by the official returns of 1831,

that there were in the city 3752 males above twenty years of age employed in manufactures. According to the returns of the same year, the whole number of the families within the city was 15,572, of whom 9174 were chiefly employed in trade, manufactures, and handicraft; 509 in agriculture; and 4889 not comprised in either of the two preceding classes.

The relative extent of trade in different towns may be in some measure determined by the amount of the postage of letters collected in them. In this view, Norwich stands the ninth in the list of English towns, being next after London, Liverpool, Manchester, Bristol, Birmingham, Leeds, Hull, and Sheffield; and the sum collected having amounted in the year 1836 to L.9557. 10s. 3d.

The corporation of Norwich, before the municipal reform law was enacted, consisted of a mayor, a recorder, two sheriffs, twenty-four aldermen, and sixty common-council men; but by that law, instead of four wards, as formerly, it is now divided into eight, with a mayor, sixteen aldermen, and forty-seven common-council men, chosen by the inhabitants, and justices of the peace and a recorder nominated by the crown. This city, as before, returns two members to the House of Commons, chosen by a very numerous body of resident electors, comprising, besides the ten-pounds householders, many hundreds of freemen. The title of Earl of Norwich was conferred upon the Scotch Duke of Gordon; but that title, as well as the dukedom, is now extinct.

NOSE, the organ of smell. See ANATOMY. The uses of the nose are, exciting in us the sense of smelling, and serving in the great office of respiration, as well as in modelling the voice, receiving the abundant humours from the eyes, and adding to the beauty of the face. The nose was by the augurs particularly attended to in forming conjectures concerning future good or ill success. The tingling of the right or left nostril, for instance, was thought to indicate different things, as it happened to different sexes, or to persons in different conditions.

NOSOLOGY is a Greek word signifying a discourse or treatise of diseases, otherwise called *pathology*. The importance of a comprehensive and accurate nosology has been long and generally allowed. Baglivi, Boerhaave, Gorter, Gaubius, and Sydenham, have expressed their desire for a work of this kind, the great object of which should be to fix the pathognomonics of every disease, or to dispose all diseases into certain classes, orders, and genera, founded on distinctions taken from the symptoms only, without regard to remote or proximate causes.

NOSTOCH, SHOT STARS; *tremella nostoc* (Lin. *Spec. Plant.*; Dillenius, *de Muscis*, tab. 10, fig. 14; *Flor. Danica*, tab. 885, fig. 1); *tremella intestinalis vel mesenterica* (Lin. *Spec. Plant.*; Dillen. *de Mus.* tab. 10, fig. 16; *Flor. Danic.* tab. 885, fig. 2). The substance in question is not unfrequent in England, and in other parts of Europe, after rains, both in spring and autumn. Very large spots of it are seen in gravelly soils, and particularly on the tops of hills and on open downs, and it is often found on gravel walks. It is met with in some of the old authors, under the name of *nostoch*, as in Paracelsus and others; and the alchemists fancied there was something wonderful in it, and that it would afford a menstruum for gold. Nostoch is said to be a word synonymous with *Jaculum alicujus stellæ, vel potius ejus repurgatione dejectum quid in terram, flos aëris, fragmentum nimbi*; as this substance was believed to fall from the sky, along with the meteors which we often see, and call *falling-stars*. Hence the country people in Sweden have called it *sky-fall*; and in England it is known by the name of *witches' butter*, in common with some of the gelatinous liver-worts.

Paracelsus, Helmont, and others, however, ranked it with the *terniabin*, or manna, and thought it dropped, as the lat-

Nose
||
Nostoch.

Nostradamus.

ter did, from heaven. It is described, and the chemical analysis of it given, by M. Geoffroy, in the Memoirs of the Academy of Sciences for 1708, and is there said to yield, besides an acid phlegm, a portion of concrete volatile salt and some fixed salt. The distilled water from it was believed by some to possess singular virtues in allaying pains of the joints; but there is certainly no ground for attributing to it any extraordinary qualities. Since the days of Paracelsus it has been considered as a vegetable production; but the botanists have had difficulty in assigning to it its place or genus in their several systems.

Naturalists had, however, for some years begun to doubt whether the substance in question was of a vegetable or animal nature, when at length the latter opinion received a strong corroboration from the observations of Mr Platt of Oxford, in a letter printed in the Gentleman's Magazine for 1776.

"From a child," says he, "I remember seeing the meteors shooting in the air, which appearance, by my comrades, was called *star-shooting*, believing the stars no larger than their apparent magnitude. This jelly-like substance, mentioned in your magazine, was believed to be the dross of these meteors, and took the name of *star-shot*, which passed for certain with me till I had arrived at the age of twenty-four, when I was engaged in business that required my frequently passing over both meadows and pasture grounds, where in spring and autumn I saw many portions of this supposed alga or nostoch, but never more than one or two contiguous, mostly near the water, when the meadows were or had been just before flooded. My conjectures were various, until I saw a crow pecking of something in a field, which I heard to cry; when turning my horse to the place, I found a frog of the common size, which the crow (of the carrion kind) would soon have killed and gorged, had I not disturbed her, and chased her away.

"About this time I found in a meadow the bowels of a frog indigested, and compact as the chitterlings of a calf or pig, but white as the paper I write upon, though not translucent. I took it up and placed it in a paper exposed to the air, leaving it in some grass where I found it, till my return that way in three days' time, when I saw it changed to that tremulous jelly-like substance, the alga or star-shot. I was much pleased with this discovery, and took it home in my pocket wrapped in a paper, where I showed it to a society of young persons of which I was a member, who agreed with my sentiments of its being the indigestible part of a frog disgorged by some bird of prey.

"To corroborate my sentiments of this alga being the bowels of a frog, I luckily saw some of it lying by the side of a brook, where I lighted and took it up, and to my great surprise found attached to the jelly the head, heart, liver, and one leg of the frog, which had been, I presume, disgorged by some carrion crow, who frequented the flooded grounds to pick up worms and other vermine. There was also some of it found on an apple-tree at Wyston Magna, near Leicester, where I then lived, which, no doubt, was disgorged by some owl."

Dr Darwin, in his Poem on the Loves of the Plants, is of the same opinion with Mr Platt, that these gelatinous substances are of an animal nature; and that the different appearances they put on are owing to various circumstances, viz. the different birds who feed on frogs, the quantity they devour at a time, and the state of digestion before they are voided.

NOSTRADAMUS, MICHAEL, an able physician and a celebrated astrologer, was descended of a noble Provençal family, and born on the 14th of December 1503, at St Remy, in the diocese of Avignon. By his grandfather he was initiated in the study of the mathematics, and he af-

Nostradamus.

terwards completed his courses of humanity and philosophy at the college of Avignon. Having repaired to Montpellier, he there applied himself to physic, till being forced away by the plague in 1525, he took his route towards Toulouse, and passed on till he reached Bordeaux. This course occupied him five years, during which he undertook the cure of all such patients as were willing to put themselves under his care. After this he returned to Montpellier, and, having been created doctor of his faculty in 1529, revisited the places where he had before practised physic. At Agen he contracted an acquaintance with Julius Cæsar Scaliger, which induced him to make some stay in that town, where he married; but having buried his wife, and two children which she had brought him, he quitted Agen after a residence of about four years. On his return to Provence, he established himself first at Marseilles; but his friends having provided an advantageous match for him at Salon, he, in 1544, transported himself thither. In 1546, Aix being afflicted with the plague, he went thither at the solicitation of the inhabitants, and proved of great service; so that the town gave him a considerable pension for several years after the contagion ceased. Returning afterwards to Salon, he became a recluse, and employed his leisure in applying to his studies. He had for a long time occasionally followed the trade of a conjurer, and now he began to think himself inspired, nay, miraculously illuminated with a prospect into futurity. As fast as these illuminations had discovered to him any future event, he entered it in writing, in enigmatical prose sentences; but revising them afterwards, he thought the sentences would appear more respectable, and would savour more of a prophetic spirit, if they were expressed in verse. This opinion determined him to throw them all into quatrains, and he afterwards ranged them into *Centuries*. When this was done, he hesitated about making them public, till reflecting that the time of many events which he had foretold was very near at hand, he determined to print them. This he did with a dedication addressed to his son Cæsar, an infant only some months old, in the form of a letter or preface, dated the 1st of March 1555. This edition, which includes seven *Centuries*, was printed by Rigault at Lyons. He prefixed his name in Latin, but gave to his son Cæsar the name as it is pronounced, *Nôtradamé*.

The public were divided in their sentiments respecting this work. Many looked upon the author as a simple visionary or a fool; whilst by others he was accused of the black art, or magic, and treated as an impious person, who held a commerce with the devil. But there were not wanting persons who believed him to be really and truly endowed with the supernatural gift of prophecy. A few remained in suspense, and refrained from giving any judgment at all respecting his pretensions. But Henry II. and Catherine of Medicis his mother, having resolved to see the prophet, he received orders to that effect, and immediately repaired to Paris. He was very graciously received at court, treated with extraordinary respect, and gratified with a present of two hundred crowns. He was afterwards sent to Blois to visit his majesty's children there, and report what he should be able to discover concerning their destinies. No doubt he exerted himself to the utmost on this occasion, but the precise nature of his prognostications is not known; it is certain, however, that he returned to Salon loaded with honours and presents. Animated with his success, he augmented his work from three hundred quatrains to a complete milliad, and published it in 1558, with a dedication to the king. But that prince having died the next year, of a wound which he received at a tournament, the book of the prophet was immediately consulted; and in the 35th quatrain of the first century this unfortunate event was found predicted in the following verse:

Notæ.

Le lion jeune le vieux surmontera,
En champ bellique par singulier duel,
Dans cage d'or les yeux lui crevera,
Deux classes une puis mourir, mort cruelle.

So remarkable a prediction added new wings to his fame, and he was shortly afterwards honoured with a visit from Emanuel duke of Savoy, and the Princess Margaret of France his consort. From this time Nostradamus found himself overburdened with visitors, and his fame daily increased. Charles IX. on visiting Salon, was eager to see him. Nostradamus, who then waited as one of the retinue of the magistrates, being instantly presented to his majesty, complained of the little esteem his countrymen had for him; upon which the monarch publicly declared, that he should hold the enemies of Nostradamus as his own, and further desired to see his children. Nor did that prince's favour stop here. Not long afterwards, in passing through the city of Arles, he sent for Nostradamus, and presented him with a purse of two hundred crowns, together with a brevet, constituting him his physician in ordinary, with the same appointments as the rest. But the prophet enjoyed these honours only for the space of sixteen months, having died at Salon on the 2d of July 1566. Besides his Centuries, we have the following compositions of Nostradamus: A treatise *de Fardemens et de Senteurs*, 1552; a Book of singular Receipts, *pour Entretenir la Santé du Corps*, 1556; a piece *des Confitures*, 1557; and a French Translation of the Latin of Galen's Paraphrase, exhorting Menedolas to apply himself to study, especially to that of physic, 1552. Some years before his death, he published a small instruction for husbandmen, showing the best seasons for their several labours, which he entitled *The Almanac of Nostradamus*. Lastly, after his death there came out the eleventh and twelfth Centuries of his Quatrains. It is to these productions that the following pungent distich was applied:

Nostra damus cum falsa damus, nam fallere nostrum est,
Et cum falsa damus, nil nisi Nostra damus.

NOTÆ, signs used in writing, which have the force of many letters. This contrivance for expedition is of great antiquity. It was known to the Greeks, and from them passed to the Romans. By whom the invention was brought to Rome has not been precisely ascertained; but the most general opinion is, that in matters of importance Tully first made use of notes or short-hand writing when Cato delivered an oration in opposition to Julius Cæsar relative to the conspiracy of Catiline. Cicero, who was at that time consul, placed *notarii*, or expert short-hand writers, in different parts of the senate-house, to take down the speech; and this was the first public occasion which we find recorded of employing short-hand writers amongst the Romans. It is unnecessary to observe, that the name of *notary*, still in use, was derived from this practice. There were three kinds of notes for short-hand writing used by the ancients, either for despatch or secrecy. The first and most ancient was that of hieroglyphics, which are rather images or representations of things than of words. The second species were called *singulariæ*, from their expressing words by single letters. Sertorius Ursatus has compiled a very copious collection of such abbreviations. The third kind were called *notæ Tironianæ*, from Tiro the freedman of Cicero, who was particularly skilled in this art; and it is to him that we are indebted for the preservation of Cicero's letters, of which a great part still remain, one entire book having been addressed to Tiro himself.

It appears that notes were in frequent use amongst the Romans, and continued to be employed till the tenth and eleventh centuries. We have indeed but few books remaining which are written in short-hand; but this is not surprising, when such was the unhappy situation of early

times, that either superstition condemned them to the flames as the works of impious magicians, or they were left, through ignorance and stupidity, to be devoured by vermin. It is probable, however, that there are still extant writings of this sort, which might contribute to enrich the republic of letters.

There are several manuscripts and instruments written in these kinds of *notæ* in the royal library of Paris. In the year 1747, the learned and ingenious M. Charpentier engraved and published at Paris a capitulary, and fifty-four charters of Louis the Pious, emperor and king of France, written in the *notæ Tironianæ*. To this work the learned editor has prefixed an *Alphabetum Tironianum*, together with a great number and variety of notes or marks for the different parts of speech, and rules for acquiring the art of writing in this kind of notes. Valerius Probus, in his book *De Litteris Antiquis*, explains many of the characters used by the short-hand writers; and there is a dictionary of them published by Gruterus.

NOTARII, persons employed by the Romans to take, by means of *notæ*, trials and pleadings in their courts of judicature, or to write as amanuenses from the mouth of an author. These *notarii* were of servile condition. Under the reign of Justinian they were formed into a college or corporate body. *Notarii* were also appointed to attend the prefects, in order to transcribe for them. There were likewise *notarii domestici*, who were employed in keeping the accounts of the Roman nobility; and when the empire became Christian, there were notaries for ecclesiastical affairs, who attested the acts of archbishops, bishops, and other spiritual dignitaries. We find ecclesiastical notaries at Rome under Pope Julius IV. and also in the church of Antioch about the year 370. From these notaries was derived the office of chancellor to the bishops; and afterwards almost every advocate was admitted a notary.

NOTARY (NOTARIUS) signifies a person who takes notes, or frames short draughts of contracts, obligations, charter-parties, or such other writings. At present we call him a *notary public*, because he publicly attests deeds or writings, in order to make them authentic.

NOTATION, in *Arithmetic* and *Algebra*, the method of expressing numbers or quantities by signs or characters appropriated for that purpose. See ARITHMETIC and ALGEBRA.

NOTES, in music, characters which are used, in writing or printing, to mark the pitch and the duration of the sounds of any musical composition. These characters or signs of notation have varied much at different times. Many alterations of those now generally received have been proposed, but not adopted. *Numerical* and *literal* methods of expressing musical sounds have been repeatedly proposed; but it seems that these are even more complicated than the signs in common use. A musical short-hand, constructed of alphabetical letters, was proposed many years ago in France, but rejected; although in numerous cases of simple melody and harmony it might be very useful in saving space to publishers of books. As to the notation of music in ancient and modern times, see Padre Martini, Hawkins, and Burney, and especially Mersenne regarding the *entablature* of some musical instruments now disused. See MUSIC.

NOTE is likewise used to signify a mark made in a book or writing, where there occurs something remarkable and worthy of particular notice; as also an observation or explication of some passage in an author, added in the margin, at the bottom of the page, or elsewhere. In this sense it stands contradistinguished to *text*.

NOTE is also a minute, or short writing, containing some article of business. In this sense we say, promissory note, note of hand, bank-note, and the like.

NOTHUS signifies *spurious* or *bastard*; and hence it is

Notarii
||
Nothus.

Notion
||
Notting-
ham.

figuratively applied by physicians to diseases which, though in respect of a similitude of symptoms they have the same denomination as some others, yet are of a different origin from them.

NOTION, a word which in common language is considered as of the same import with idea. See METAPHYSICS.

NOTITIA, in literary history, a book which gives an account of a particular country, city, or other place. Such are the *Notitia Imperii Romani*, the *Notitia Romæ Antiquæ*, and other similar works.

NOTO, a city of the island of Sicily, in the kingdom of Naples, the capital of the province of the same name, 149 miles from Palermo. It stands on a rocky hill, in a fine but unhealthy situation. It has elegant streets, with noble churches and convents, and forms one of the most respectable places on the island; whilst the surrounding soil, though much of it is neglected, is of abundant fertility. Its port is Avola, about seven miles distant. It contains 1958 houses, and 13,300 inhabitants.

NOTO, *Val di*, one of the three valleys or provinces into which Sicily is divided, and which lies between the sea, the Val di Demona, and the Val di Mazara. Noto is the capital town.

NOTTINGHAM, a large market-town of England, the capital of the county of the same name, in the centre of England. It is a place of great antiquity, deriving its name from the Saxon word *Snottingham*, which is descriptive of its position as a retreat in rocks, since there were formerly many, and are still a few, caverns, cut on the soft rock on which its castle was built. It is by some antiquaries asserted that it was once a Roman station; but that is a subject of controversy. The earliest records notice some incursions of the Danes about 866; but they appear to have received a check from the town, and a defeat near it from King Alfred, who afterwards made it the winter-quarters of his army. William the Conqueror erected a castle, and constructed fortifications so strong as to render the place impregnable against any of the methods of attack which were then known. King Richard Cœur de Lion assembled a parliament in this place previously to his departure for the Holy Land, and another soon after his return from Palestine. It was from Nottingham that Richard III. marched forth to his fatal battle of Bosworth Field. There Charles I. erected his royal standard at the commencement of the civil war, at the spot which is now covered by St James' Church. The Castle of Nottingham, defended by the royalists, was besieged by the parliamentary forces under the command of Colonel Hutchinson, to whom, after a brave defence, it at length surrendered, the particulars of which are related in a most interesting manner by the wife of that officer. When Cromwell had attained supreme power, he ordered the fortifications to be destroyed and the castle to be dismantled. At the beginning of the present century, this town and neighbourhood were distinguished by the riotous disposition manifested amongst the lower orders, who acquired the denomination of Luddites, and were excited to destroy much of that machinery by the aid of which the town subsequently attained to its present high degree of affluence. These disturbances were quelled by the power of the law, and some wholesome severities; but it caused the removal of many of the capitalists, and a large portion of the trade, to distant and more tranquil districts. During the excitement respecting parliamentary reform in 1832, a very violent spirit was manifested, which led to the destruction of a silk-mill in the neighbourhood, the burning of the ancient castle belonging to the Duke of Newcastle, and outrages upon private houses. These disturbances led to a few exemplary punishments, and some heavy burdens on the town, to indemnify those whose property had suffered by the riots.

Nottingham is finely situated upon the side of a hill overlooking the valley of the Trent, and near to the southwestern extremity of what was formerly the forest of Sherwood, once famous as the resort of the celebrated Robin Hood, but now a well-cultivated district. The environs of the town are picturesque and beautiful; and there is a delightful walk on the bank of the river Leen, having a fine view of the south front of the castle, and of the gardens, which were formerly the fish-ponds belonging to that edifice. The windings of the river Trent have also a great effect on the whole scenery.

Some of the old streets are narrow, but in the great extension of the place of late years some new and spacious avenues have been built, and much improvement has been judiciously effected. The market-place is one of the finest in England. It is spacious, occupying an area of 27,515 square yards, or rather more than five acres and a half. It is well paved, and admirably adapted for the purpose of the three weekly markets held in it on Wednesday, Friday, and Saturday, the last of which is the principal one. At the east of the market-place stands the Exchange Hall, which is a noble-looking building. The pediment is crowned with a well-proportioned pedestal, on which stands the figure of Justice. On the pediment are the town arms, with an oak branch on one side, and an olive branch on the other; and underneath it, with a clock intervening, is a handsome Venetian window, ornamented with two elegant Ionic columns, which lights the spacious room within it. That apartment, when the temporary doors which divide it are thrown open, is 123 feet long, thirty wide, and thirty high, with an arched ceiling. It is used for public dinners, at which more than 400 persons can be commodiously seated, and also for public meetings. This room was nearly destroyed by an accidental fire in 1836, but has been restored and further beautified. One part of the building is appropriated to magisterial business, and another is occupied by the Artisan's Library; an institution possessing some thousand volumes, which are lent out to members, who pay seven shillings and sixpence on admission, and one shilling and sixpence quarterly. Underneath the Exchange there are a few shops in front, but the principal part of the ground-floor is appropriated to shambles. In another part of the market-place is the Subscription Library, containing a large collection of valuable books; and a news-room; a cabinet of mineralogy, with sculpture, maps, and portraits of eminent individuals connected with the town, amongst whom are Colonel Hutchinson, Lord Byron, Sir Richard Arkwright, and others.

The other civic buildings are the county jail and hall, a commodious but not elegant structure; the house of correction, which stands on the site of a convent of the hospitallers of St John of Jerusalem; the town hall and town jail, where the borough assizes and sessions, and the mayor's and sheriff's courts, are held; the assembly-room, a very elegant building, just erected and fitted up with much taste; and the free grammar school, in which about a hundred boys are gratuitously instructed in Greek and Latin.

The edifices for religious worship are in about the same proportion to the number of the inhabitants as is seen in other places which have increased with similar rapidity. St Mary's is usually denominated the mother church of the town, from its priority of erection. It resembles a cathedral more than a parish church in its extent, its architecture, and its decorations, and is the most striking object in the place, when viewed from what is called the high pavement. It stands on an elevated spot, and is said to be nearly seventy feet above the level of the meadows near the town. The date of the erection is unknown, but is said to have been in the fifteenth century. It is in the form of a cross, and has a handsome square tower, in which there

Notting-
ham.

Nottingham

is a musical peal of ten bells. The length of the structure in the inside is 216 feet, the breadth in the centre ninety-seven, at the west end or principal entrance sixty-seven, and in the chancel twenty-nine feet. The height of the tower is 126 feet, and that of the side aisles sixty feet. The porch on the south side is a very ancient piece of workmanship, on the fluting of the pediment of which were sculptured red and white roses, some traces of which may even yet be discovered. In the west gallery there is an excellent organ of great power, supported by two Tuscan columns, over which is a picture of David playing on his harp. There are in this church many monumental inscriptions on tombs of the family of the Earls of Clare, and one of an Earl of Meath, and the mausoleum of the family of the Wrights.

Besides the mother church, there are provided for the adherents of the established worship the following edifices, all of them capacious, and appropriately finished, viz. St James', St Nicholas', St Paul's, and St Peter's. The chapels of various sects are numerous, amounting to twenty, but some of them are very small. They are classed thus: Independents; Baptists, two subdivisions; Wesleyan Methodists, three subdivisions; and one each for Unitarians, Roman Catholics, Quakers, Huntingdonians, and Inghamites or Sabellians.

The charitable institutions depending on endowed foundations or on voluntary contributions are numerous. The General Hospital, built in 1781, contains about two acres of land, given partly by the Duke of Newcastle, and partly by the corporation. It is supported chiefly by subscriptions, and usually contains about 120 patients; whilst between five and six hundred are out-patients, receiving medical advice and assistance. The General Lunatic Asylum is a modern and spacious brick building, erected in 1810, at an expense of nearly L.20,000. There are extensive courts, gardens, and places for recreation, and the whole economy of the place is constructed in such a manner as may best contribute to the recovery or the welfare of the miserable inhabitants. Labray's and Lambley's Hospitals are small asylums for aged widows; and Collins' Hospital is a splendid charity, founded by one of the Smith family of the town, of which Lord Carrington is the present head. It consists of twenty-four small but convenient dwellings for as many poor widows, each of whom receives four shillings weekly, and two tons and a half of coal every year. From the same endowment Carrington Street Hospital has lately been built, where twenty poor persons are comfortably accommodated. Plumtree Hospital, founded by a family of that name, since transplanted into Kent, in the year 1392, but twice repaired since, viz. in 1650 and 1751, has been rebuilt under an act of parliament passed in 1823. Thirteen aged widows are provided with comfortable dwellings within the house, and allowed six shillings weekly, whilst thirty others, called out-pensioners, receive ten pounds a year. Willoughby's Hospital contains nineteen tenements, the inhabitants of which receive a small pension. Woolley's Alms are dwellings for six poor persons; and Bilby's Almshouses for eight persons, who have each a loaf weekly, and two tons of coal at Christmas. Warser's Gate Hospital gives apartments to six, and Hanley's to twelve poor persons.

The other public edifices that deserve notice are the Barracks, built in 1792, a handsome building, with well-contrived apartments for officers and for the privates, and suitable stabling for three troops of horse; the Riding School; a small theatre, never long opened nor much attended; the water-works, in two parts of the town; the gas-works; and the bridge over the river Trent after that stream has been augmented by the waters of the Dove and the Derwent.

The population of this town in 1801 amounted to

VOL. XVI.

28,861, in 1811 to 34,253, in 1821 to 40,415, and in 1831 to 50,680. This great increase, arising from the progressive extension of its manufacturing industry, is not, however, confined within the limits of the town, but is exhibited in the villages either contiguous to it and forming its suburbs, or at a few miles distance. Thus Snenton, which conjoins the town, contained in 1801 but 558, and in 1831 it had 3605 inhabitants; Radford, a parish within a mile of Nottingham, had in 1801 but 2269, and in 1831, 9806 persons; Lenton, another parish, in 1801 had 893 inhabitants, and in 1831, 3077. There are other parishes near to it, in which a similar progress has been making, so that Nottingham, with its dependencies, may be estimated, supposing that the increase since 1831 has been at the same rate as in the previous periods, to have more than 70,000 individuals. According to the account of Mr Rickman, the males above twenty years of age employed in the stocking and lace trade are, in Nottingham 4740, in Radford 1300, in Lenton 300, at Snenton 430, and at Beeston 300.

The Trent, which is navigable up to the town, and the various canals which branch from that river, afford the means of easy communication with every part of the kingdom.

The chief accumulation of capital in the town and its vicinity has been from its manufactures. The most ancient, and still the most extensive, is that of stockings. The earliest introduction of that neat piece of machinery, the stocking-frame, at nearly the same period into Leicester and Nottingham, gave to those towns a superiority in fabrication, which has subsequently been maintained, and which has nearly superseded the domestic manufacture of knitting stockings. The stockings of the two towns, made either from wool, thread, cotton, or silk, are to be seen in every part of the world, and far excel in beauty and cheapness any that are made elsewhere in imitation of them.

The prosperity of Nottingham has, however, been advanced in a prodigious degree by a new manufacture executed by machinery, analogous to that of the stocking-frame, but contrived with a greater portion of mechanical ingenuity. This article of commerce is known by the name of bobbin net. It generally resembles lace, and has in a great degree supplanted that pillow lace for which Flanders, France, and some counties of England were once highly celebrated.

Although this trade originated at Nottingham, yet the riotous disposition of the workmen called Luddites (which has been already noticed), who opposed all those improvements in machinery to which the extension of this trade has been indebted, caused many of the capitalists to remove their establishments to other and some very distant counties. Yet, notwithstanding such removals, and the rivals thereby created, the trade here has gone on increasing, and is still most extensive in and around Nottingham. Our limits do not admit of tracing the various steps of improvement with great minuteness. At first, only plain nets were made, then quillings were introduced, and afterwards figured or fancy patterns were produced. The two last are the highest priced, and the chief object of the manufacturers here. The number and description of the machines in January 1836 were thus dispersed:—In Nottinghamshire, 372 for plain nets, 1006 for quillings, and 784 for fancies; in Leicestershire 207 for plain, thirty-seven for quillings, ninety-nine for fancies; in Derbyshire 192 for plain, forty-nine for quilling, fourteen for fancies; in Devonshire, Somersetshire, and the Isle of Wight, 654 for plain, thirty for quilling, 103 for fancies. Total for plain 1425, for quillings 1122, for fancies 1000. The improvement made by the introduction of the quilling and fancy nets has caused additional capital to be invested in machinery, and the employment of from 1500 to 2000 additional

Nottingham

Nottinghamshire.

workmen; and the above statement shows that this benefit has principally fallen to the share of Nottingham.

The following calculation, made by Mr W. Felkin, will show, in a national point of view, the great value of this apparently minute branch of industry. That gentleman estimates that, in the year 1835, there were used in this trade 1,850,000 lbs. of sea-island cotton wool, valued at L.185,000, and 25,000 lbs. of silk, valued at L.40,000. The produce of these raw materials, and their disposal, are stated by the same person thus: Home consumption for nets, L.320,000; for quillings, L.210,000; for fancies, L.580,000; total, L.1,110,000. Foreign trade, for nets, L.340,000; for quillings, 282,000; for fancies, L.480,000; total, L.1,102,000.

The plain nets made in the other parts of the kingdom are mostly sent to Nottingham in the rough state, where they receive the finishing operations of gassing, bleaching, and dressing. The amount of these was, in the year 1835, L.328,000; so that this town, besides the profit upon the goods manufactured in and near it, gains a considerable share of the profit upon the goods made by their rivals.

The net wages earned by men vary from twelve to thirty-five shillings a week, according to the kind, the width, and the speed of the machines at which they are employed. Sixteen shillings is about the average. Wages to women vary from three to twelve shillings, as they may be occupied, but average about six shillings a week. Children are paid from one to four shillings, and can be useful as embroiderers, or in mending and winding. Mr Felkin says it is difficult to estimate how many persons altogether are employed in the various departments of this flourishing trade.

Besides the staple trades, there are, in and around the town, several large factories for spinning and weaving cotton goods.

Nottingham has been celebrated for its ale, the qualities of which have been the theme of song. It is still good, and very potent. Its excellence has been attributed by some to the good quality of the barley grown in the neighbourhood, by others to the purity of the water, and by many to the excellent cellars scooped out of the rock with which most of the good houses are furnished.

This town returns two members to the House of Commons. The freemen, who were formerly the sole electors, are still numerous, but are exceeded in number by the ten-pound voters.

By the municipal corporation reform law passed in 1835, this town is to continue a corporation, is divided into seven wards, and has a mayor, fourteen aldermen, and forty-one councillors, with twelve justices of the peace appointed by the crown.

NOTTINGHAMSHIRE, an inland county of England, bounded on the north by Yorkshire and a part of Lincolnshire, on the east by Lincolnshire, on the south by Leicestershire, and on the west by Derbyshire. It is of an oval figure, with its narrowest end towards the north. Its greatest length is about fifty miles, and its greatest breadth twenty-seven. Its circumference is estimated at 140 miles. According to the statement of Mr Rickman, the extent is 837 square miles, or 535,680 acres.

The county is divided into six hundreds, or, as they are usually denominated, wapentakes; three of which are to the north and three to the south of the river Trent. It contains nine market-towns, and 207 parishes. The annual value of all the real property of the county, as taken in the year 1815, for the purposes of the property-tax, was found to be L.737,220. The number of inhabitants at each of the four decennial enumerations amounted, in 1801 to 140,350, in 1811 to 162,000, in 1821 to 186,873, and in 1831 to 225,400. The burials in the ten years from 1821

Nottinghamshire.

to 1831 appear to have been one in fifty-four of the inhabitants then living. The illegitimate births were one in twenty of the whole births.

The occupations of the inhabitants in 1831, according to the arranged returns of Mr Rickman, were as follow:

Occupiers of land employing labourers.....	2,643
Occupiers of land not employing labourers.....	2,414
Agricultural labourers.....	11,799
Employed in retail trades and handicraft.....	14,683
Capitalists, bankers, and professional men.....	2,093
Labourers not agricultural.....	5,628
Employed in manufactures and machinery.....	14,260
Other males under twenty years of age.....	56,582
Male servants of all ages.....	1,132
Female servants.....	7,886

The number of inhabited houses was 44,936, occupied by 47,117 families. Of these, 13,351 were employed chiefly in agriculture, 25,578 in trade, manufactures, and handicraft, and 8188 belonged to neither of the foregoing classes.

The towns and villages containing more than 1500 inhabitants, and the numbers in each, were, in 1831,

Nottingham.....	50,680	Lenton.....	3,077
Newark.....	9,557	Bulwell.....	2,611
Mansfield.....	9,426	Retford.....	2,491
Basford.....	6,325	Hucknall-Torkard.....	2,200
Worksop.....	5,566	Clareborough.....	2,106
Sutton Ashfield.....	4,805	Kirby Ashfield.....	2,032
Greasley.....	4,583	Carleton.....	1,784
Arnold.....	4,054	Bingham.....	1,738
Southwell.....	3,386	Stapelford.....	1,533

The face of the country is generally level, with moderate undulations; and its beauties are of a mild description, somewhat picturesque in the vicinity of Sherwood Forest, but displaying neither the striking features of the adjoining county of Derby on its western side, nor the flat insipidity of the plains of Lincolnshire on its eastern side. From its position between these two descriptions of country, and from its moderate elevation, it enjoys a milder climate than either, partaking neither of the raw air of the one nor the moist atmosphere of the other. The dryness of the climate is favourable to early vegetation, and is supposed to be the cause of the seed-time and harvest in Nottinghamshire commencing at the same period as in the more southern counties.

The soil of this county is very various. On the borders of Derbyshire there is a stripe of land with coal and limestone, partly in wood, but mostly under arable culture. Parallel to it is a broader tract, including Sherwood Forest, the soil of which is chiefly sandy and gravelly; but though naturally sterile, it has in some degree been brought into a productive state by the extensive cultivation of turnips, and the maintenance of considerable flocks of sheep. The tract which adjoins is a clayey soil, extending to the banks of the river Trent. It is chiefly arable land, but varied with woods and meadows, and highly productive of wheat, oats, beans, and, in some parts, of hops. The lands on the banks of the Trent are very fertile, being mostly devoted to pasture, on which many oxen are fattened; and some of the dairies are extensive. The arable land of this district is celebrated both for the quantity and the quality of the oats which it produces. The beautiful vale of Belvoir, in the south-easternmost part of the county, enjoys some of the best soils, both for pasture and arable husbandry, of any part of this island. The farms are in general small, and commonly held by tenants at will, the rents taken from whom are generally moderate; and a very great proportion of the land is free from the burden of the tithes. The spirit of agricultural improvement has not proceeded so far as in many other counties, though it has made considerable progress of late years. Neither the breeds of

Nottinghamshire. cows and sheep, nor the modes of cultivation, differ so much from those of the adjoining counties as to deserve any especial notice.

There are no mines except those of coal, which are exclusively confined to a narrow district bordering on Derbyshire; the coal is of good quality, very abundant, and, by means of internal navigation, diffused throughout the whole county. Excellent stone for building is raised in many parts, some of which has the peculiarly valuable quality of improving by exposure to the weather. Many parts of the county abound in veins of gypsum. In the parish of Gotham it is found in strata of the thickness of three feet. At Beaconhill, near Newark, there are large quarries of this substance. Although it has been much praised as a manure, the trials of it that have been made in its vicinity have not been attended with such beneficial results as to induce the continued use of it for that purpose.

The Forest of Sherwood, formerly celebrated as the scene of the exploits of Robin Hood, whose deeds amused our nursery days, is mostly an open heathy plain, bordered with recent plantations, and upon which the plough has made very extensive encroachments. The boundaries of the forest are extensive, it being twenty-five miles in length, and from seven to nine in breadth; but a great portion of it has become the property of private individuals, and is enclosed in farms and parks; in the latter of which is to be found the deer with which this forest was once most abundantly stocked. The trees of most ancient date are those now remaining on the estates of the Duke of Newcastle and Lord Manvers.

Nottinghamshire is, for its population, one of the greatest manufacturing counties. The frames for making hosiery were the discovery of a clergyman of this county named Lee, in the reign of Queen Elizabeth, who, finding but little encouragement in England, repaired to Paris, and commenced his work under the auspices of Henry IV. The murder of that monarch having deprived him of a patron, he died of chagrin in France, and the workmen returned home, when, after many fluctuations, the machinery was introduced into this county. The making of stockings, caps, pantaloons, and other similar articles, has long given employment to the great mass of the labouring population; and of late years the making of lace upon a similar principle has been introduced, and created additional employment. Although the riotous conduct of the workmen, under the denomination of Luddites, has driven some of the large capitalists to other parts of the kingdom, yet the hosiery business is by far the most important means of employment throughout the whole county. The spinning of cotton-yarn, from its natural connection with hosiery, has been introduced and very widely extended; and the establishments at Nottingham, at Mansfield, at Newark, at Southwell, and several other places, are upon an extensive scale. There are also several large manufactories for spinning worsted yarn. Malting and brewing are carried on to a considerable extent; and the beer of Nottingham and of Newark rivals that of Burton-upon-Trent. There are potteries at Sutton Ashfield; starch is made near Southwell; and sailcloth and candlewick at Retford.

The foreign trade of this county is mostly conducted by the mercantile houses of London and Liverpool; but some of the larger manufacturers export their own goods, both to the continent of Europe and to the more distant parts of the world.

The river Trent, the fourth in magnitude of the English streams, passes across the county, and is navigable for barges throughout the whole of it; but its deficiencies of water and its shoals are such great impediments that a canal by the side of it, ten miles in length, is found of great use to the intercourse. The other rivers are not navigable,

but are beneficial for the purposes of irrigation. They are the Erwash, the Soar, the Maun, the Meden, the Wollen, the Worksop, the Idle, the Lene, and the Dover or Dare. These all discharge their waters into the Trent. The canals are, the Nottingham, the Grantham, the Idle, and the Chesterfield. The last of these is about forty miles in length; the others about ten each. By means of these and the Trent, the intercourse by internal navigation is extended to almost every district of the county.

The titles derived from this county are those of Marquis of Granby, Earl of Mansfield, Viscount Newark, and Barons Pierrepont and Carrington. For election purposes, the county has been divided into two districts, the northern and the southern. Each of them returns two members. The election for the northern division is held at Mansfield, and the polling places are, that town, East Retford, and Nottingham. The election for the southern division is held at Newark, and the other polling places are Bingham and Southwell. The three boroughs, Nottingham, Newark, and Retford, return each two members, as before the passing of the reform bill. The whole of the county is in the diocese of York, and it is on the midland circuit of the judges.

The remains of Roman and Saxon antiquities are numerous. Amongst the former are the camps at Barton Hill, at Combes Farm, at Gringley, at Hexgrave, and at Wenny Hill, and a Roman villa near Mansfield. Amongst the latter are the Castle of Newark, the abbey of Newstead, Rufford, and Welbeck; the priories of Mattersey and Worksop; and the churches of Bingham, Blythe, Southwell, and Balderton.

The most distinguished natives of this county have been, Archbishop Cranmer, Dr Erasmus Darwin, Sir Martin Frobisher, Denzil Lord Holles, Ireton the son-in-law of Cromwell, Lady Mary Wortley Montagu, Paul Sandby, Archbishop Secker, Gilbert Wakefield, and Bishop Warburton.

The seats of noblemen and gentlemen of the first class are as numerous as in any county of England. Of these, the most remarkable are the following, viz. Annesley Hall, J. W. Chaworth, Esq.; Babworth Hall, Honourable J. B. Simpson; Bunney Park, Lord Rancliffe; Clifton Grove, Sir Gervas Clifton; Clipstone Park, Duke of Portland; Clumber Park, Duke of Newcastle; Colwich Hall, John Musters, Esq.; Grave, A. H. Eyre, Esq.; Holme Pierrepont, Earl Manvers; Hurgarton Hall, G. D. L. Gregory, Esq.; Kelham House, J. M. Sutton, Esq.; Langold, H. Gally Knight, Esq.; Lenton Priory, William Stretton, Esq.; Muskham, J. Pocklington, Esq.; Newstead Abbey, late Lord Byron (now the property of Major Wildman); Norwood Park, Sir Richard Sutton, Bart.; Osberton, F. F. Foljambe, Esq.; Ossington Hall, J. Denison, Esq.; Rufford Abbey, Honourable J. L. Saville; Stanford Hall, C. V. Dashwood, Esq.; Stappleford, Sir John Borlase Warren; Thoresby Park, Earl Manvers; Welbeck Abbey, Duke of Portland; Wollaton Hall, Lord Middleton; Worksop Manor, Duke of Norfolk.

NOVAIA, a small town of Tobolsk, in Asiatic Russia, situated on the Irtysh, one hundred miles east-south-east of Tobolsk.

NOVARA, a province of the duchy of Piedmont, in the continental dominions of Sardinia. It extends over 610 square miles, and comprehends one city, 117 market-towns and villages, and about 100,000 inhabitants. It is a level district, watered by the rivers Ticino, Sesia, and Agnola, the streams of which are spread by numerous small canals, so as to irrigate the whole of the surface; but as the water is not stagnant, the air is not generally insalubrious, excepting near the extensive rice-grounds. Much corn is raised, and some of the best silk, with hemp, flax, and fruits.

The capital is the city of the same name, situated on a

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Nova Scotia.

hill at the foot of which flows the river Agnona; it is fortified, is the seat of a bishop, and has a cathedral. It contains several parish churches, seventeen convents for the two sexes, and two thousand houses, with 14,662 inhabitants. The city has two colleges and a theological seminary. The chief occupations of the inhabitants consist in weaving silk and linen, and some smaller trades. Long. 8. 32. 25. E. Lat. 45. 26. 58. N.

NOVA SCOTIA, a British province of North America, situated between the parallels of 43. 25. and 46. 0. north latitude, and the meridians 61. 0. and 66. 30. of west longitude, and connected with the south-east part of the continent by an isthmus of only eight miles in width. It is bounded on the north by the Strait of Northumberland, which divides it from Prince Edward Island; on the north-east by the Gut of Canseau, which interposes between it and the island of Cape Breton; on the south and south-east by the Atlantic Ocean; on the west by the Bay of Fundy; and on the north-west by New Brunswick. Its extreme length from Cape Canseau on the east to Cape St Mary's on the west is about 280 miles; but its breadth varies from fifty to about a hundred miles, and it contains a superficies of 15,617 square miles, or 9,994,880 acres. From this, however, nearly one third may be deducted for lakes, arms of the sea, and rivers, leaving about seven millions of acres of land, five millions of which may be considered as adapted for cultivation, and the remainder as affording tolerable pasturage. It is estimated that above three millions of acres of these lands still remain vacant, and in the hands of the crown; but the largest unoccupied tracts do not in one place exceed forty thousand acres.

The most remarkable physical characteristic of this peninsula of the North American continent is the numerous indentations along the coast. The shores are lined with rocks, and studded with thousands of small islands; and close to these, and in the harbours, almost without exception, there is a considerable depth of water. All along the southern shore there is a succession of noble harbours; and coasting vessels sail amongst and within the myriads of islands which line the coast during the most blustering weather, thus enjoying comparatively smooth water, whilst the main ocean heaves in violent agitation. The interior of the country is very agreeably diversified with hill and dale, river and lake, forest and grassy plain. The surface, although undulating, is not mountainous, the highest land, Ardoise Hill or Arthur's Seat, being only 810 feet above the level of the sea, nearly the same height as Arthur's Seat at Edinburgh. The highlands generally run north and south, branching off in all directions, and in some instances terminating in bold cliffs on the coast, the most remarkable of which is Aspotagoen, between Mahon and Margaret's Bay, which is about 500 feet in height. The Horton Mountains run nearly north and south; and the north mountains, which are washed by the Minas Basin, terminate in Cape Blomidon. The Blue Mountains, which lie in the interior of the counties of Annapolis, Shelburn, and Queen's, are said to retain traces of volcanic eruption. There is a great variety of rocks in Nova Scotia, but granite, trap, and clay-slate predominate. The most abundant variety is the gray granite, which prevails along the shore, and is well adapted for mill-stones. Trap rocks, sometimes interstratified with clay-slate, protrude in various places in immense parallel ridges above the surface, and frequently in piles of loose masses heaped confusedly together, traversed frequently by veins of quartz. Clay-slate of a very fine quality, and used as a building stone, prevails in the eastern section of the colony; and graywacke and graywacke-slate extend along both shores of Chedabucto Bay, in which are found beds of limestone and numerous species of specular iron ore. In connection with carboniferous limestone are found,

both in Cape Breton and Nova Scotia, those immense coal fields which are supposed to rival in extent the mines of the mother country. Varieties of copper, iron, and lead ores are also abundant; and different other minerals of less importance are found. Salt springs, some of them strongly impregnated with saline matters, are met with near Pictou, at River Philip, and some other parts. The soil of Nova Scotia is of many different qualities, and various degrees of fertility. The alluvial, or intervale lands, of which there are extensive tracts, are rich, and produce plentiful returns of wheat, barley, oats, Indian corn, potatoes, turnips, with all the vegetables and fruits common in England. Some of the uplands, lying between the hilly country and the rivers, are light and poor, whilst the high lands are rich and very productive. The lands on the southern coast are generally so rocky as to admit of cultivation only at much expense and labour; but after the stones are removed, the soil is by no means barren.

The interior of Nova Scotia is intersected and watered by numerous rivers, lakes, and streams, which beautify and enrich the country. The two largest rivers are the Annapolis and the Shubenacadie. The former takes its rise in King's county, and, running parallel with the bay of Fundy, after a long and serpentine course, in which it receives the Moose and Bear Rivers, discharges itself into Annapolis Bay. It is navigable to a considerable extent, and its banks present a rich and pleasing landscape. The Shubenacadie, issuing from the Grand Lake in the county of Halifax, divides that county from Hants, and, after a rapid and circuitous course, the length of which has not yet been accurately ascertained, discharges itself into the Bay of Minas. It receives the waters of ten other rivers, is navigable for large vessels a long way into the interior, and contains on its banks inexhaustible quantities of gypsum and lime, together with extensive groves of fine timber. At Pictou, three rivers, navigable for large vessels, empty themselves into the harbour; the East, West, and Middle Rivers. Besides these, there are the Avon, navigable for a considerable distance; the La Have, which issues from a chain of interior lakes, and has a course of about sixty miles; the Mersey, which winds from Lake Rosignol through the Queen's county, and discharges itself into Liverpool Harbour; the Medway, the Shelburn, the Clyde, the Tuskent, the St Mary, and others, all of which owe their origin to lakes in the interior. The most extensive still sheet of water is the Rosignol, situated partly in each of the three counties of Queen, Shelburn, and Annapolis. It is said to be thirty miles in length, but is little known. Lake George is also of considerable size; and there are innumerable others, which it is unnecessary to mention. The forests of Nova Scotia still constitute a prominent feature of the country. The trees are the same as those common to America, and the timber is generally large and lofty. Amongst the natural curiosities of this country is a huge granite stone, supposed to weigh about a hundred and sixty-four tons. It stands on the margin of a small lake, encircled with wood, near Halifax, and is so nicely poised on a flinty base of twelve inches, that the strength of one hand will put it in motion, but that of several hundreds could not shift it from its place. There are several remarkable caverns and grottoes, one of which, at St Peter's Point, on the coast of the Bay of Fundy, displays in the interior a spacious hall, the roof of which is fretted with stalactites; and brilliant gems are observed sparkling at the moment that the light of a torch or a candle approaches. The climate of Nova Scotia was for many years after its discovery considered as an insuperable barrier to agricultural industry, and an idea long prevailed in England that it was peculiarly the region of snow and fog. The temperature is indeed colder in winter in this peninsula than it is in Great Britain;

Nova Scotia.

Nova Scotia.

but when the weather is cold it is usually dry, and altogether the winter is milder, and the summer less intensely hot, than at Quebec. The summer heat is moderate and regular; the autumn is a delightful season; and there is seldom any severe winter weather until the end of December. Frost continues generally from Christmas to April, only interrupted by a thaw, which almost invariably takes place in January. The heaviest snow-storms occur in February. Rain falls in greatest abundance in spring and autumn; and a fog prevails on the south shore near the mouth of the Bay of Fundy, but does not extend far inland.

The wild animals are the moose, cariboo, bear, loup-cervier, tiger-cat, fox, marten, otter, mink, beaver, muskrat, porcupine, racoon, wood-chuck, fisher, weasel, squirrel, hare, and the like, all of which, excepting the two last, have rapidly decreased in number. Nearly all the birds common to North America frequent Nova Scotia; and there are but very few kinds of fish which are found in the American seas that do not frequent the shores of this colony in vast swarms.

Nova Scotia is divided into ten counties, including Cape Breton; and the counties are subdivided into districts and townships as follows, viz. Halifax, divided into the districts of Halifax, Colchester, and Pictou, and containing the townships of Halifax, Dartmouth, Preston, Lawrence Town, Truro, Onslow, Londonderry, Pictou, Egerton, and Maxwellton; Lunenburg, containing the townships of Chester, Lunenburg, and Dublin; Queen's county, containing the township of Liverpool; Shelburn, containing the townships of Shelburn, Yarmouth, Barrington, Argyle, and Pubnico; Annapolis, containing the townships of Digby, Clements, Clare, Annapolis, Granville, and Wilmot; King's county, containing the townships of Aylesworth, Cornwallis, Horton, and Sherbrooke; Cumberland, containing the townships of Wallace, Amherst, and Pamborough; Hants, containing the townships of Falmouth, Windsor, Rawdon, Kempt, Douglas, and Newport; Sydney, divided into the Upper and Lower Districts, and containing the townships of St Mary's, Guysborough, Manchester, Wilmot, and Dorchester, or Antigonish; and Cape Breton, divided into the north-western, north-eastern, and southern districts. The townships are not all of equal extent, nor are there, as will be seen, the same number in each county. The inhabitants meet, like an English parish, in vestry, and assess themselves for the support of the poor. This regular subdivision affords facilities for the administration of justice; and the principal townships send representatives to the House of Assembly.

Halifax is the largest county in the province, stretching quite across it from the Atlantic Ocean to Cumberland Straits. It is bounded on the east by the county of Sydney, on the west by the counties of Hants and Lunenburg, and on the north by the county of Cumberland. The whole southern shore is washed by the Atlantic Ocean, and a part of the northern shore by Northumberland Straits. With the exception of the township of Halifax itself, the general appearance of the three districts into which the county is divided corresponds with that of the province as a whole; its surface being everywhere diversified by hill and dale, and well irrigated by rivers and brooks. All the southern part which lies upon the Atlantic is high, broken, rocky land; interspersed here and there with some good belts of soil, but in general it is barren and uncultivated. The extensive tract of country surrounding the Great Lake bears the same character, as does that which extends several miles along the eastern and western sides of the Shubenecadie River. Halifax, the capital city of the province, is situated on the south-east coast, in latitude 44. 40. north, and longitude 63. 40. west. It is built on the eastern side of a small peninsula, upon the declivity of a hill, which rises

gradually from the water's edge; its length being about two miles, and its breadth about half a mile, with wide streets crossing each other at right angles, and containing nearly 2000 houses, and a population, including strangers, of about 20,000. It has been very much improved within the last ten years. The front of the town is lined with wharfs, alongside of which vessels of all sizes are continually discharging or taking on board their cargoes. The harbour of Halifax has perhaps not a superior in any part of the world, affording safe anchorage for a thousand ships at once; and it is accordingly the chief naval station of Great Britain in North America. It is accessible at all seasons of the year, being scarcely ever ice-bound, as Quebec annually is. It lies nearly north and south, extending in this direction about sixteen miles, and terminating in a beautiful sheet of water called Bedford Basin, within which are ten square miles of excellent anchorage. The bay from which the entrance of the harbour leads is formed between Sambro Head and Devil's Island, on the former of which a lighthouse was very early erected. There are four islands still farther in, upon the smallest of which, opposite the town, there are batteries strongly mounted, whilst several other fortifications command the harbour. A second lighthouse has been established on M'Nab's Island, situated near the mouth of the harbour. This island forms two entrances to the harbour; the eastern passage being for small vessels only, the other having depth of water for ships of all sizes. Above the wharfs already mentioned are numerous warehouses; and on the acclivity are the houses of the citizens, public buildings, and other structures. The houses are very irregular in height, but many of them are handsome stone and brick buildings, whilst those of wood are neatly faced with plaster or stucco. The public edifices are substantial, the Province Building in particular being one of the finest in our American colonies. It contains chambers for the council and legislative assembly, the supreme court, and all the provincial offices. The government-house, at the south end of the capital, is an antique baronial-looking edifice; and the military hospital, and other structures, are elegant and substantial. The dock-yard is one of the finest establishments out of Britain. There are a number of churches, and other places for public worship; and several markets, which are extremely well supplied with necessaries. Amongst the benevolent institutions of this city may be mentioned a college, which was established in 1820; and seven or eight newspapers, and a monthly magazine, are published. The intercourse between Halifax and Europe, America, the West Indies, &c. is regular and certain; and ever since its first settlement in 1749, it has continued to be of considerable importance, not only as a rendezvous for his majesty's ships, and as the head-quarters of the troops on the establishment of the lower American provinces, but also as the centre of a profitable fishery and trade. The manufactures carried on consist chiefly of sugar-refining, distillation of spirits, porter and ale brewing, and the making of soap, candles, leather, flour, and cordage, and a few other minor articles. Halifax is a free warehousing port, and its trade is very considerable.

Opposite to Halifax, on the eastern side of the harbour, stands the little town of Dartmouth. It was laid out about the time that the capital was founded, but in 1756 it was destroyed by the Indians, together with most of the inhabitants. It was subsequently resettled, and has slowly increased in population, and extended in size. The lands on the Dartmouth side of the harbour are much less stubborn than those on the opposite shore; and the industrious descendants of the original German settlers have long subjected them to a fair and profitable cultivation. The various other townships or settlements in the county of Halifax it is unnecessary to particularize individually.

Nova Scotia.

Nova Scotia.

They all contain a considerable quantity of excellent soil, and a small town or hamlet where the settlers reside. Truro, situated on the southern side of Cobequid Bay, near its head, contains about one hundred houses, and a number of public buildings. The district of Pictou, which contains three townships, has a very good soil, and, besides a great coal-field, abounds with iron ore, copper, freestone, and lime. It has a number of excellent harbours, the principal port being called Pictou. It is admirably situated on the Straits of Northumberland, opposite Prince Edward Island, on the route from Halifax to Quebec, between which places there is not a safer or better shelter for ships. The town of Pictou, situated about two miles from the entrance, is well built, and contains four churches, with other public edifices, and about 3000 inhabitants. It is a free port, and its trade in lumber, coal, and the fishery, is considerable. An excellent newspaper is published at this place.

The county of Lunenburg is bounded on the north by King's county and that of Annapolis, on the south by the Atlantic Ocean, on the east by Halifax, and on the west by Queen's county. It extends forty miles from east to west, and its extreme width is thirty-five miles, exclusive of nearly three hundred islands scattered along its shores. The land is in general covered with spruce and fir timber, well watered, and capable of cultivation. The principal harbour is Mahon Bay, which is very extensive, and affords secure anchorage inside its numerous islands to vessels of the greatest magnitude. Chester town is situated on the north side of the bay, about nine miles from its mouth, upon a snug and commodious harbour. It is a thriving place, and carries on a very considerable lumber trade and fishery. It was first settled by people from New England, who afterwards abandoned the place. They were succeeded by Germans, who, being industrious, soon secured their own independence and the prosperity of the settlement. The population of the bay amounts to about 2000, who are chiefly employed in agriculture, preparing lumber for exportation at the saw-mills, and in fishery. Near the entrance of Mahon Bay, upon the western side, lies the harbour of Lunenburg, the county town. It is regularly constructed, and contains the county buildings, above 140 dwelling-houses, besides stores, and about 1400 inhabitants of Dutch and German origin. A few miles to the westward is La Have, one of the largest rivers in Nova Scotia, and settled principally by Germans, who own a number of saw-mills and grist-mills. The harbour is very spacious, consisting of an outer and an inner place of anchorage. Considerable quantities of fish are taken here, and several vessels are annually freighted with lumber and timber for Great Britain. Several islands well calculated for drying fish lie at the entrance, and they also form a protection to the shipping. Most of the islands in this county remain in their natural state; but one, called the Great Tancook, is settled, and contains thirty families.

Queen's county is bounded on the east by the county of Lunenburg, on the west by the county of Shelburn, on the north by the county of Annapolis, and on the south by the Atlantic Ocean. The interior of this county is stony, and generally incapable of cultivation. On the sea-board, however, it is better, and there are here several tracts of respectable soil, and some thriving settlements. Liverpool, the county town, and the second place in the province, is situated upon a harbour of the same name, about eighty miles west from Halifax. It is regularly laid out and well built, containing a court-house, jail, several places of public worship, a fort, above two hundred dwelling-houses, and a great many wharfs, stores, and other buildings. There is a good lighthouse at the entrance of the harbour, which never freezes over. The trade of the place is very flourishing, consisting chiefly in lumber and fish; but a con-

siderable trade in timber is also carried on. Port Medway, into which the river Medway runs, is a very fine harbour, capacious, and safe. There are some other small settlements in this county, but none requiring special notice.

Shelburn county is bounded on the north by Annapolis county, on the south and west by the Atlantic Ocean, and on the east by Queen's county. It contains four townships, one of which, Yarmouth, comprises 100,000 acres of land, exclusive of lakes, of which Lake George is one. In the interior, this county remains, with few exceptions, in the state of a wilderness; but some parts are agreeably diversified, and in point of scenery it is one of the most beautiful portions of Nova Scotia. Shelburn, the shire-town, is built upon a harbour of the same name, which is esteemed one of the best in America. It has a lighthouse at the entrance, and is twelve miles in length, easy of access, and perfectly secure, affording anchorage for the largest vessels. This town was at one time of considerable importance, containing, it is said, about 12,000 inhabitants; but the population does not now exceed 500. A few miles westward of Shelburn is Cape Negro Harbour, sheltered by a high island of the same name. It forms the embouchure of the river Clyde, which winds forty miles through the county, has finely wooded banks, and, next to Annapolis, the most beautiful stream in the province. Within Cape Sable Island, the most northern point in Nova Scotia, is Barrington Harbour, where fishing to a considerable extent is carried on. Yarmouth or Cape Fourché Harbour is the principal and most thriving place in this part of the province. Its harbour is large, well sheltered, safe, and navigable for ships up to Yarmouth village. Yarmouth and its neighbourhood contain an industrious population of about 4500 inhabitants, who possess about seventy vessels and large stocks of cattle. It has always gone on steadily improving, and promises, from its numerous local advantages, to become a place of considerable importance. Shebogue River, in this part of the province, is navigable for seven miles from the sea, and at its mouth expands into a good harbour.

Annapolis county is bounded on the north and west by the Bay of Fundy, on the south by Shelburn, Queen's, and Lunenburg counties, and on the east by King's county. The first European settlements in Nova Scotia were established in this county by the French, who made some very extensive improvements. They founded Annapolis, the county town, and gave it the name of Port Royal. It is built upon a peninsula, which, projecting into the river of the same designation, forms two beautiful basins, one above and another below the town. Although once the metropolis of Nova Scotia, it is not now more than a thriving village, containing about sixty dwelling-houses, with the government buildings, several places of public worship, and some stores. The trade is comparatively insignificant, and arises principally from the fishery. Digby, which has sprung up into a town within the last fifty or sixty years, is a much larger place, containing about two hundred houses. The inhabitants here and in the neighbourhood are principally engaged in the cod and mackerel fishery along the coast. Bridgetown, another thriving village, is situated at the head of the navigation of the river, and from this place the produce of the inland districts is shipped for exportation. Fish of various kinds, such as shad, bass, salmon, and particularly herring frequent Annapolis basin. About seven miles from Annapolis, on a stream called Moose River, an iron foundery has been established by a company under the protection of a legislative charter. The buildings are extensive and substantial, and the iron ore is excellent; but a similar work at Pictou possesses the great advantage of a coal mine in the immediate vicinity. The basin of Minas, in this county, is one of the two great

Nova Scotia.

Nova Scotia. branches of the Bay of Fundy. Its entrance is through a strait about three miles in width, with bold, abrupt shores, within which it widens from eight to sixteen miles, and, receiving the waters of upwards of twenty rivers and streams, extends about fifty miles to the head of Cobequid Bay. The tide rises sometimes so high as seventy feet in the bay, and flows with great rapidity, particularly when under the influence of high winds. The other townships of this county are thriving places, containing from 1000 to between 3000 and 4000 inhabitants.

King's county is bounded on the south by the counties of Lunenburg and Hants, on the north by the Bay of Fundy, on the east by Cumberland county, and on the west by that of Annapolis. The township of Horton, in this county, contains about 4000 acres of diked land, besides intervalle and salt marshes; and the upland, which is hilly and broken, consists mostly of good tillage land. The principal town is Kentville, on the borders of Cornwallis, containing several good private houses, a court-house, a jail, and a grammar school. The township of Cornwallis is well watered by several rivers, and the land throughout is of the very best quality, being so fertile as to have obtained the name of the garden of the province. The township of Aylesford is similar to it in soil and productions; but that of Parrsborough is much broken and hilly, although in many parts the soil is excellent.

Cumberland county is bounded on the north-west by the Chignecto Channel, the Missiguash River, and part of New Brunswick; on the east by the straits of Northumberland; on the south-east by the county of Halifax; and on the south-west by King's county. The soil of this county is various, containing a considerable portion of excellent land, with some that is not so productive. On the shore of the Chignecto Channel and Cumberland Basin there are considerable tracts of valuable marsh land. The upland is in general of very superior quality, and there are several thousand acres of dike land of the most productive description. Coal, lime, and gypsum, are found almost everywhere; and iron and copper ores have been discovered at several places. Rivers and streams traverse the county in almost every direction, and it has several fine harbours on both its shores. It contains a number of thriving settlements, particularly those of Fort Lawrence, Amherst, Wallace, and West Chester; but none of the towns requires particular notice.

Hants county is bounded upon the north by the Minas Basin, on the east by Shubenacadie River, which separates it from Halifax, on the south by parts of the counties of Halifax and Lunenburg, and on the west by King's county. This county contains a considerable quantity of the very finest soil, and is well settled throughout. Windsor, the shire-town, is situated at the confluence of the Avon, Windsor, and St Croix Rivers, and is a neat, well-built place, containing about one hundred and thirty dwelling-houses, and a number of public buildings, particularly an university, King's College, an academy called the Collegiate School, and several places of worship. This is the only town in the county, the other settlements being small hamlets planted in positions favourable for agriculture or fishing.

Sydney county, forming the most easterly part of the province, is bounded on the west by the county of Halifax; on the south by the Atlantic Ocean; on the east by Chedabucto Bay, the Gut of Canseau, and St George's Bay; and on the north by Northumberland Straits. It is divided into an upper and a lower district, the former being, in an agricultural point of view, far superior to the latter; and, notwithstanding the numerous and beautiful harbours on the

bays and coasts, and the valuable fisheries, it is much more populous. The village of Dorchester, situated about a mile above the navigation on Antigonish River, is the principal trading place in the district. The lower district of Sydney extends on its interior or northern boundary about forty miles, and on its western side (on the sea coast) about one hundred and twenty miles. No part of Nova Scotia, and perhaps few countries in the world, can boast of so many excellent harbours in the same extent of coast. Many of them are navigable for the largest vessels, and numbers affording safe and extensive anchorage-ground for ships of moderate size occur at intervals of only a few miles. The soil along the shore being stubborn, the agricultural resources of this part of the county are inferior to those of the upper district; but it possesses much greater facilities for commerce and navigation, and its fisheries are the best in the province.

For a general description and history of Cape Breton, the reader is referred to the article BRETON, CAPE. In many respects it bears so close a resemblance to Nova Scotia as to supersede any further description. The staple products of the island are fish, coal, gypsum, and timber. In 1832 the exports were, timber, 9500 loads; coals, 22,911 chaldrons; pickled fish, 21,000 barrels;¹ dried fish, 44,000 quintals; oil, 2500 barrels; live stock, 820 head; oats, 6000 bushels; potatoes, 13,000 ditto; total value, L.780,000. The imports, consisting chiefly of British manufactures, amount to nearly the same sum. The revenue, amounting to about L.4000 a year, is expended in salaries to a few public functionaries, in improving roads, and for other purposes. This island is incorporated with Nova Scotia, and contains about 30,000 inhabitants, who send two members to the Provincial Assembly.

Sable Island, although distant about eighty-five miles from Nova Scotia, is considered as belonging to that province. It lies directly in the track of vessels bound to or from Europe, and has been the scene of numerous and melancholy shipwrecks. Within a few years forty vessels have been wrecked on it; and in one year two hundred people perished on its shores. It is thirty miles in length by about one and a half in breadth, the west end being in latitude 43. 56. 42. north, and longitude 60. 71. 15. west; and the eastern end in latitude 43. 59. 5. north, and longitude 59. 42. west. It is a barren desert throughout, the soil consisting chiefly of sand, and the only vegetable productions being a coarse grass and some wild berries. A sum of L.800 is devoted to keeping on the island a superintendent from Nova Scotia, with a party of men provided with provisions and other necessaries, for the purpose of affording assistance to any shipwrecked mariners, of whatsoever nation, who may be driven upon its inhospitable shores. There is a small stock of cattle on the island, but the chief supplies of food are obtained from Nova Scotia.

Agriculture was long almost entirely neglected in Nova Scotia, as other pursuits afforded a more immediate return for labour and capital. In fact, the cultivation of the soil was looked upon as rather a degrading employment, and ranked far below that of the petty shop-keeper or itinerant pedlar. In 1817, however, a board of agriculture was formed, the objects of which were, the encouragement of agriculture on the most approved system; the improving of the breed of horses, and of all kinds of live stock; the importing of the best kinds of seeds, and the awarding of prizes to those who should excel in these various departments. Under the auspices of this society and its numerous branches, agriculture has made greater advances than could have been anticipated from the contempt in which it had previously been held; but still farming operations are rather clumsily conducted.

¹ A great part of the fish taken here is transported directly to Halifax, and therefore does not appear in the Cape Breton returns.

Nova Scotia. The soil will produce, and the climate ripen, all the agricultural productions of England in great perfection, so that it is unnecessary to specify individual crops. The province is well stocked with horses, horned cattle, sheep, and swine; and the last species of stock has more than doubled within the last twenty-five years. There are few manufactures, properly so called, carried on in Nova Scotia; but the preparation of lumber and ship-building are sometimes so denominated. Saw-mills abound in every district, and the quantity of lumber prepared and exported is immense. Ship-building is carried on to a great extent. The average

quantity has been estimated at 10,000 tons per annum, principally sloops, schooners, and vessels for the fisheries. The total quantity of timber shipped from the colony in 1833 was valued at L.62,447. The total value of the produce of the mines exported was L.105,329, and of the fisheries L.127,455. There were exported besides, beef, pork, flour, grindstones, gypsum, and other articles, to the value of L.592,136, making the total amount of exports L.887,367. The following parliamentary return presents a tabular view of the exports from Nova Scotia, exclusive of Cape Breton, for several years ending 5th January.

Nova Scotia.

	1830.	1831.	1832.	1833.	1834.	
Seal skins.....	14,913	3,365	49,412	51,918	22,229	number.
Oil.....	618	715	694	704	596	tons.
Fish, dry.....	158,289	151,807	161,174	160,640	232,269	quintals.
Ditto, pickled.....	45,741	45,433	52,063	36,070	53,128	barrels.
Ditto, ditto.....	3,416	2,999	3,200	2,168	1,470	half ditto.
Timber, &c.....	25,182	26,182	33,261	38,192	36,386	tons.
Gypsum.....	28,059	44,253	47,857	45,058	93,962	ditto.
Boards and planks.....	12,450,250	9,876	8,833	9,984	14,774	feet.
Vegetables.....	68,213	63,503	58,691	64,712	75,592	bushels.
Spars.....	976	1,322	689	1,689	2,366	number.
Staves.....	4,068	3,051	2,386	2,714	3,133	thousands.
Grindstones.....	...	...	...	2,192	36,386	tons.

The fish is thus the staple article of the trade of this province. The fishery is carried on principally on the eastern shore, in and about Chedabucto Bay; on the southern shore, at Lunenburg, Liverpool, and Shelburn; on the western shore, at Yarmouth, Clare, Argyle, and Barrington; and at Annapolis, in the Bay of Fundy. The fish principally taken are cod, herrings, mackerel, shad, alewives, and salmon. The British fishermen complain much of the injuries which they receive from the French and Americans, who are permitted to fish upon the coasts of our North American colonies.

The imports of Nova Scotia consist chiefly of British manufactures and spirits, sugar, wines, and other articles from our colonies. The following is an abstract of goods imported between the 31st of December 1832, and the 31st of December 1833, for which duties were paid or secured at the excise office, including the island of Cape Breton:—Wine, 113,671 gallons; rum, brandy, and gin, 887,352 gallons; sugar, 41,990 cwts.; beef and pork, 6016 pounds; flour, 32,263 pounds; tobacco, 186,690 pounds. The amount of goods imported, paying *ad valorem* duties, was L.347,388, and the amount of duties levied was L.105,386. The total value of the importations for that year was L.1,035,660.

With regard to the shipping of the colony, the total number of vessels inwards in 1833 was 1950, of 163,385 tons; and in 1834, 3068, of 253,921 tons. The total number outwards in 1833 was 2330, of 179,956; and in 1834, 3116, of 250,239 tons. They belonged chiefly to Great Britain and the British colonies. To show the increase of trade, it may be stated, that in 1807 the shipping entering Nova Scotia was not more than 25,000 tons.

The revenue of Nova Scotia is chiefly derived from the custom and excise duties above mentioned, to which are added other items of small amount derived from the sale of crown lands, which in 1831 realized L.645, and in 1832, L.1063; from the rent of the coal-mines, which is upwards of L.4000 per annum; and from the lighthouse dues, which amount to an annual average of L.2000. According to a document first printed in Mr Montgomery Martin's work on the British colonies, the revenues for a series of years were as follow:—

Years.	Colonial Gross Revenue.	Parliamentary Grants.	Total.
	£	£	£
1821	31,430	...	31,430
1822	32,097	...	32,097
1825	37,004	9,395	46,399
1826	38,360	11,245	49,605
1827	59,886	...	59,886
1829	81,887	13,998	95,885
1830	52,030	16,245	68,275
1831	85,018	13,125	98,143

The colony of Nova Scotia is quite adequate to defray all its civil expenditure, and the parliamentary grants, much of which had been applied to clerical purposes, were nearly all withdrawn in 1833, with the exception of that given to the Society for the Propagation of the Gospel. In 1831 the civil and military expenditure amounted to L.94,876, which was less than the revenue. Besides the salaries of the different functionaries, a considerable sum has been laid out annually in making and repairing roads and bridges, keeping up lighthouses, and for the purposes of religion and education. The established church is Episcopalian, and under the management of a bishop, archdeacon, and thirty-two clergymen, who by the last census had under their charge 28,659 people. Of the church of Scotland there are twelve ministers, having 37,227 hearers. Of the Roman Catholic church there are a bishop and fourteen priests, with 20,401 members. There are, besides, 19,790 Baptists, 9408 Methodists, 2968 Lutherans, 4417 dissenters from the church of England, 405 from the church of Scotland, 153 Quakers, and some few other persuasions. About 50,000 acres of land have been granted for the support of religion and schools. For the year ending November 1832 there were in the province 420 schools, at which 11,771 scholars attended; and independently of these there were twenty-four grammar-schools. Dalhousie College, at Halifax, is in constitution similar to the University of Edinburgh. There is a fine institution, called King's College, at Windsor, with regularly educated

Nova Scotia professors and others; and Pictou College is likewise an excellent institution.

Nova Scotia is governed by a lieutenant-governor, council, and house of assembly. The president of the council is the chief justice of the province; the next in station is the bishop, and there are ten other members. The house of assembly contains forty-two members, each of the ten counties returning two, except the county of Halifax, which returns four, and the town of Halifax two; seventeen other towns return each a member, and the island of Cape Breton sends two. The house of assembly act, and the laws are administered, as in Canada. There is a strong body of militia for the defence of the province, the name of every male from sixteen to sixty being enrolled. The king's troops consist of artillery and engineer detachments, and two regiments of infantry. Halifax is the chief naval station for the West Indies and North America, the commander-in-chief being a vice-admiral, with a suitable fleet. The forts protecting Halifax town and harbour are strong, and the interior of the country is well guarded by the militia.

By the last census, which was taken in the year 1827, the population, exclusive of Cape Breton, was 123,848. In 1837 it cannot be estimated under 145,000; for during the last ten years a great quantity of land has been sold, and a number of settlers have gone out, whilst the revenue has also greatly increased. The inhabitants consist of natives, the descendants of Europeans, English, Scotch, Irish, Americans, loyalists, Germans, Acadian French, Indians, and freed negroes. They mingle and live together in much harmony, and, generally, the social state of this province is rapidly improving. Its prosperity has greatly increased; and, instead of importing, it now exports provisions. Its fisheries, to which proper attention is at length paid, its rich and prolific soil, and its mines of coal and iron, are sources of wealth which were too long neglected by Great Britain.

Our limits will only admit of a brief abstract of the history of Nova Scotia. Ancient authorities state that it was discovered by the Cabots in 1497; but it was not until 1604 that the French attempted to form settlements. They were, however, expelled from it by the English colonists of Virginia, who claimed the country in right of the discovery of Sebastian Cabot. In 1621, Sir William Alexander obtained a grant of the whole peninsula, and it was named in the patent Nova Scotia, instead of Acadia, as the country was called by the French. In the mean time, the latter obtained a footing in it a second time; and it was not until 1654, when a strong force was despatched by Cromwell, that the French settlers were brought under subjection. In 1667, Nova Scotia was ceded to France by the treaty of Breda; but, after suffering during the war which broke out in 1701, as well as previously, it was finally ceded to England by treaty in the year 1711. From this period till 1749 it was neglected by Great Britain; but the designs of the French called the attention of government to the province. Encouragements were held out to settlers, parliament gave a large grant, and about 4000 adventurers with their families embarked for the colony. Halifax was immediately founded; but the French settlers, under the name of neutrals, were still very numerous; and, with the aid of the Indians, they inflicted repeated injuries upon the British, until they were forcibly expelled by the latter. In 1758 a constitution was granted to Nova Scotia; and the capture of Louisburg, in the island of Cape Breton, during the same year, gave additional security to the colony, which now began to improve. By the treaty of Paris, 10th of February 1762, France resigned all further claims on any of her former possessions in North America, and nothing of any material importance has since occurred. New Brunswick and Cape Breton were separated into two distinct governments in 1784, and the latter was

VOL. XVI.

re-annexed to Nova Scotia in 1819. This the colonists strongly protested against, and applied to government to allow them to remain as a separate province; but, as might have been expected, their application proved unsuccessful.

(R. R. R.)

NOVATIAN, a priest of Rome, but originally a pagan philosopher. He was baptized in bed when dangerously ill; having recovered, he was afterwards ordained priest through the favour of his bishop, although the clergy and the people were far from being disposed to grant it. He does not appear to have had the good of the church much at heart; for, with his wit, knowledge, and eloquence, he might have been peculiarly serviceable to her, had he not meanly shrunk from his duty when he dreaded persecution. His ambition to be a bishop likewise misled him; and the circumstance which occasioned the apostacy of most of the first heresiarchs also occasioned his. On the death of Fabian, bishop of Rome, Novatian, after writing a letter to St Cyprian, remained quiet whilst the see was vacant; but the promotion of Cornelius excited his envy and jealousy to the highest pitch. The consequence was a separation from the new bishop, and from those who professed to believe, what Novatian strenuously denied, that the church could receive those again who had been guilty of idolatry. He soon got together a number of followers amongst the laity, and some even amongst the clergy. Novatus, a priest of Carthage, was one of his party, and having been opposed to St Cyprian, brought his adherents with him. In an infamous and clandestine manner he got himself consecrated bishop of Rome, by three weak men, whom he had grossly imposed upon; and one of them afterwards did penance for having been concerned in what was so contrary to order, decency, and the rules of the church. His designs, however, in this disgraceful affair did not succeed; for he was not acknowledged as bishop of that diocese, Cornelius being confirmed in it, whilst he was condemned and excommunicated. He still, however, taught his doctrine, and at length became the head of the party which bears his name. St Jerome says he wrote on the Passover, on the Sabbath, on Circumcision, on the high priests, on prayer, on Jewish meals, and on firmness of mind, besides a large treatise on the Trinity. But none of these works appears under his own name, and some are thought not to be his.

NOVATIANS, *Novatiani*, a sect of ancient heretics, who arose towards the close of the third century, and were so called from Novatian, a priest of Rome. They were also denominated *Cathari* or Puritans. Novatian first separated from the communion of Pope Cornelius, on pretence of his being too easy in admitting to repentance those who had fallen off in times of persecution. Novatus coming to Rome, joined himself to the faction of Novatian, and both maintained that there was no other admission into the church but by the repentance in baptism, grounding their opinion on the words of St Paul: "It is impossible for those once enlightened, and who have tasted the heavenly gift, if they fall away, to renew themselves by repentance." Not that they denied but a person who had fallen into any sin, however grievous, might obtain pardon by repentance; for the Novatians themselves recommended repentance in the strongest terms. But their doctrine was, that the church had not the power to receive sinners into its communion, as having no way of remitting sins but by baptism, which, once received, could not be repeated. In process of time the Novatians softened and moderated the rigour of their master's doctrine, and only refused absolution to very great sinners. The two leaders were proscribed, and declared heretics, not for excluding penitents from communion, but for denying that the church had a power of remitting sins.

NOVATION, or INNOVATION, in the *Civil Law*, de-

20

Novatian
||
Novation.

Novatus
||
Novel.

notes the change of one kind of obligation for another; as when a promise is accepted instead of a written obligation.

NOVATUS, a priest of Carthage in the third century, who, to avoid being punished for a crime, joined with the deacon named Felicissimus against St Cyprian. In 251 he went to Rome, and there found Novatian, who had acquired great reputation by his eloquence, but who murmured at his not being raised to the see of Rome in preference to Cornelius. Novatus soon contracted a friendship with him, and afterwards promoted the consecration of Novatian. This irregular proceeding produced a very great schism. Novatus also maintained that the church had not the power to receive those into communion who had fallen into idolatry.

NOVEL, a fictitious narrative in prose, which professes to exhibit the natural workings of the human heart, the happiness and misery of private life, and, above all, the nature of the affection called love, and the consequences of indulging it in certain circumstances. A critic, by no means too indulgent to works of fancy, and amongst whose failings laxity of morals has never been numbered, thus expresses himself on the subject of novel-writing. "These familiar histories," says Dr Johnson, "may perhaps be made of greater use than the solemnities of professed morality, and convey the knowledge of vice and virtue with more efficacy than axioms and definitions. But if the power of example is so great as to take possession of the memory by a kind of violence, and produce effects almost without the intervention of the will, care ought to be taken, that, when the choice is unrestrained, the best examples only should be exhibited; and that what is likely to operate so strongly, should not be mischievous or uncertain in its effects."

We have said that the novel professes above all things to exhibit the nature of love, and its consequences. Whether this be essential to such performances, may perhaps be reasonably questioned; but it has been made an important part of the drama in most novels, and, we think, with great propriety. It is the object of the novelist to give a true picture of life, diversified only by accidents that daily happen in the world, and influenced by passions and qualities which are really to be found in conversing with mankind. To accomplish this object, he conceives a hero or heroine, whom he places in a certain rank of life, endows with certain qualities of body and mind, and conducts, through many vicissitudes of fortune, either to the summit of happiness or to the abyss of misery, according to the passion which he wishes to excite in his readers. In the modern novel, this hero or heroine is never placed on a throne or buried in a cottage; because to the monarch and the cottager no difficulties occur which can deeply interest the majority of readers. But amongst the virtuous part of the intermediate orders of society, that affection which we call *love* seldom fails, at some period of life, to take possession of the hearts of both sexes; and wherever it has place, it must be productive of happiness or of misery. In the proper management of this passion consists much of the difficulty of the novel writer. He must exhibit his hero as feeling all the pangs and pleasures of love, as sometimes animated with hope, and sometimes ready to sink into despair, but always exerting himself to obtain the gratification of his wishes. In doing this, care should be taken, either that he never transgress the laws of virtue, or that at least he never transgress them with impunity.

"It is justly considered," says the writer above quoted, "as the greatest excellency of art to imitate nature; but it is necessary to distinguish those parts of nature which are most proper for imitation: greater care is still required in representing life, which is so often discoloured by

passion or deformed by wickedness. If the world be promiscuously described, I cannot perceive of what use it can be to read the account; or why it may not be as safe to turn the eye immediately upon mankind, as upon a mirror which shows all that presents itself without discrimination. It is therefore not a sufficient vindication of a character, that it is drawn as it appears; for many characters ought never to be drawn: nor of a narrative, that the train of events is agreeable to observation; for that observation which is called knowledge of the world will be found much more frequently to make men cunning than good. The purpose of these writings is surely not only to show mankind, but to provide that they may be seen hereafter with less hazard; to teach the means of avoiding the snares which are laid by treachery for innocence, without insuring any wish for that superiority with which the betrayer flatters his vanity; to give the power of counteracting fraud, without the temptation to practise it; to initiate youth, by mock encounters, in the art of necessary defence; and to increase prudence without impairing virtue.

"Many writers, for the sake of following nature, so mingle good and bad qualities in their principal personages, that they are both equally conspicuous; and as we accompany them through their adventures with delight, and are led by degrees to interest ourselves in their favour, we lose the abhorrence of their faults, because they do not hinder our pleasures, or perhaps regard them with some kindness for being united with so much merit. There have been men indeed splendidly wicked, whose endowments threw a brightness on their crimes, and whom scarce any villany made perfectly detestable, because they never could be wholly divested of their excellencies: but such have been in all ages the great corrupters of the world; and their resemblance ought no more to be preserved than the art of murdering without pain.

"In narratives, where historical veracity has no place, there should be exhibited the most perfect idea of virtue; of virtue not angelical, nor above probability (for what we cannot credit we shall never imitate), but the highest and purest that humanity can reach, which, exercised in such trials as the various revolutions of things shall bring upon it, may, by conquering some calamities and enduring others, teach us what we may hope, and what we can perform. Vice (for vice is necessary to be shown) should always disgust; nor should the graces of gaiety, or the dignity of courage, be so united with it as to reconcile it to the mind. Wherever it appears, it should raise hatred by the malignity of its practices, and contempt by the meanness of its stratagems; for while it is supported by either parts or spirit, it will seldom be heartily abhorred."

It is farther observed by Johnson, that the task of the novel writer "requires, together with that learning which is to be gained from books, that experience which can never be attained by solitary diligence, but must arise from general converse and accurate observation of the living world. Their performances have, as Horace expresses it, *plus oneris quantum variae minus*, little indulgence, and therefore more difficulty. They are engaged in portraits of which every one knows the original, and can detect any deviation from exactness of resemblance. Other writings are safe, except from the malice of learning, but these are in danger from every common reader; as the slipper ill executed was censured by a shoemaker who happened to stop in his way at the Venus of Apelles.

"But the fear of not being approved as a just copier of human manners, is not the most important concern that an author of this class ought to have before him. Novels are written chiefly to the young, the ignorant, and the idle, to whom they serve as lectures of conduct and introduc-

Novel.

Novelty. tion into life. In every such work, it should therefore be carefully inculcated, that virtue is the highest proof of understanding, and the only solid basis of greatness; and that vice is the natural consequence of narrow thoughts; that it begins in mistake, and ends in ignominy; and since love must be introduced, it should be represented as leading to wretchedness whenever it is separated from duty or from prudence."

For some striking and profound observations on the effects of novel-reading, the reader is referred to what Mr Stewart has written upon that subject in his *Elements of the Philosophy of the Mind*. See the article **ROMANCES**.

NOVEL, in the civil law, a term applied to the constitutions of several emperors (*novellæ constitutiones*), more particularly those of Justinian. See **CIVIL LAW**.

NOVELTY, or **NEWNESS**. Of all the circumstances which raise emotions, not excepting beauty, nor even greatness, says Lord Kames, novelty has the most powerful influence. A new object produces instantaneously an emotion termed wonder, which totally occupies the mind, and for a time excludes all other objects. Conversation amongst the vulgar never is more interesting than when it turns upon strange objects and extraordinary events. Men tear themselves from their native country in search of things rare and new; and novelty converts into a pleasure the fatigues and even perils of travelling. To what cause shall we ascribe these singular appearances? To curiosity, undoubtedly; a principle implanted in human nature for a purpose extremely beneficial, that of acquiring knowledge; and the emotion of wonder raised by new and strange objects inflames our curiosity to know more of such objects. This emotion is different from admiration. Novelty, wherever found, whether in a quality or action, is the cause of wonder; admiration is directed to the person who performs any thing wonderful.

The pleasure of novelty is easily distinguishable from that of variety. To produce the latter, a plurality of objects is necessary; the former arises from a circumstance found in a single object. Again, where objects, whether co-existent or successive, are sufficiently diversified, the pleasure of variety is complete, though every single object of the train be familiar; but the pleasure of novelty, directly opposite to familiarity, requires no diversification.

However natural novelty may be, it is matter of experience, that those who relish it the most are careful to conceal its influence. Love of novelty, it is true, prevails in children, in idlers, and in men of shallow understanding; and yet, after all, why should one be ashamed of indulging a natural propensity? A distinction will afford a satisfactory answer. No man is ashamed of curiosity when it is indulged to acquire knowledge. But to prefer any thing merely because it is new, shows a mean taste, which one ought to be ashamed of. Vanity is commonly at the bottom, and leads those who are deficient in taste to prefer things odd, rare, or singular, in the hope of distinguishing themselves from others. In fact, this appetite reigns chiefly amongst persons of a mean taste, who are ignorant of refined and elegant pleasures.

Of this taste we have some memorable instances in men of the highest and the best education. Lucian tells a story of Ptolemy I. which is as disgraceful to him as it is honourable to his subjects. This prince had ransacked the world for two curiosities; one was a camel from Bactria, black all over, the other a man half black half white. These he presented to the people in a public theatre, thinking they would give them as much satisfaction as they did him; but the black monster, instead of delighting them, affrighted them; and the party-coloured man raised the contempt of some and the abhorrence of others. Ptolemy, finding the Egyptians preferred symmetry and beauty to the most astonishing productions of art or nature without

them, wisely removed his two anomalous trifles out of sight; the neglected camel died in a little time, and the man he gave for a song to the musician Thespis.

NOVEMVIRI, nine magistrates of Athens, whose government lasted but for one year. The first of them was called *archon*, or prince; the second *basileus*, or king; the third *polemarchus*, or general of the army; the other six were called *thesmothetæ*, or lawgivers. They took an oath to observe the laws, and, in case of failure, obliged themselves to bestow upon the commonwealth a statue of gold as large as themselves. Those who discharged their office with honour were received into the number of the senators of Areopagus.

NOVI, a city of the duchy of Genoa, in Italy, now belonging to Sardinia. It is situated on the great road to Piedmont, has a strong castle, several churches, and 5572 inhabitants, who prepare some of the best silk in the district, in which they have a brisk trade, as well as in colonial productions.

NOVICE, a person not yet skilled or experienced in an art or profession. In the ancient Roman militia, *novicii* or *novitii* were the young raw soldiers, distinguished by this appellation from the veterans. In the ancient orders of knighthood, there were novices or clerks in arms, who went through a kind of apprenticeship ere they were admitted knights.

NOVICE is more particularly used in monasteries for a religious person still in his or her year of probation, and who has not made the vows. In some convents the superior has the direction of the novices. In nunneries the novices wear a white veil, the rest a black one.

NOVICIATE, a year of probation appointed for the trial of religious, whether or not they have a vocation, and the necessary qualities for living up to the rule, the observance of which they are to bind themselves to by vow. The noviciate lasts a year at least, in some houses more. It is esteemed the bed of civil death to a novice, who expires to the world by profession.

NOVOGOROD. See **NOWOGOROD**.

NOWADAH, a town of Hindustan, in the province of Bahar, fifty-four miles south-south-east from Patna. Near it there is a pass through the mountains. Long. 85. 40. E. Lat. 24. 54. N.

NOWAGUR, a town of Hindustan, in the province of Gundwana, situated on the north-west bank of the Mahanuddy River. It belongs to the Nagpore-Mahrattas, and is thirty miles south-south-east from Ruttunpoor. Long. 82. 55. E. Lat. 21. 55. N.

NOWED, in *Heraldry*, signifies knotted, from the Latin *nodatus*; being applied to the tails of such creatures as are very long, and sometimes represented in coat-armour as tied up in a knot.

NOWOGOROD, a province of Great Russia, which takes its name from the city which is now its capital, but was formerly that of the whole of Russia. The governments of Olonez, Pfkow, Twer, and a part of that of St Petersburg, were included in it, till the recent divisions of the empire were established. It now extends between 57. 18. and 61. 8. north latitude, and between 20. 4. and 29. 41. east longitude, over 56,616 square miles. It contains ten cities, and 7932 villages, which are formed into 690 parishes, having each a church. The inhabitants are 964,500, and almost exclusively adhere to the Greek worship. The face of the country is level, though it includes the Waldai Hills; but none of these is more than 300 feet above the level of the sea. The soil in the northern part is marshy, and chiefly covered with moss; but in the south there is some dry and good land, the cultivation of which rewards the labourer, and the province produces more corn, chiefly rye, than it consumes. It also yields flax, hemp, and much wood. The climate is severe, being nearly similar to that

Novemviri
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Nowogorod.

Nowogorod
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Nuayhas.

of St Petersburg. The fisheries on the rivers and lakes yield much subsistence. There is but little commerce, and none but domestic manufactures.

NOWOGOROD, a city of Russia, the capital of a province, and of one of the thirteen circles of the same name into which that province is divided. It is situated in latitude 58. 32. 31. north, and longitude 31. 14. 16. east. It is the seat of the military government of Twer, as well as of both the military and civil governments of the province in which it stands. The site is on the banks of the Wolchow, where the water of the Ilmen is received into that stream, forming a river of more than a mile in breadth. The antiquities of the city are more striking than its beauties. The cathedral, with its brazen gates, is an object of curiosity for its venerable age, as is the tomb of St John of Nowogorod, a saint to whose shrine numerous pilgrims resort. It contains fifty-eight stone and four wooden churches, three monasteries, and 1550 houses, with 10,100 inhabitants. Though ill built, and with irregular narrow streets, it has an imposing appearance at a little distance, from the numerous spires and cupolas which are displayed. The chief occupations of the people are making sail-cloth and tanning leather.

NOWOGOROD SEWERSK, a circle of the Russian province Tschernigow, extending in north latitude from 51. 51. to 52. 24. and in east longitude from 31. 51. to 34. 19. The capital is a city of the same name, situated on the river Desna, 751 miles from St Petersburg. It is surrounded with walls, and has a castle, but neither in a good state of repair. It contains 1600 ill-built houses, with 8300 inhabitants, who carry on no manufactures, and subsist by trading in the productions of the surrounding soil. Long. 32. 48. E. Lat. 52. 50. N.

NOWOSILL, a circle of the Russian province of Tula, extending from north latitude 52. 53. to 53. 36. and from east longitude 37. 10. to 37. 25. and containing 94,600 inhabitants. The capital is a town of the same name, situated on the river Narutsha, 736 miles from St Petersburg, and containing 200 houses, with 1560 inhabitants. Long. 36. 55. E. Lat. 52. 55. N.

NOWPOORAH, a town of Hindustan, in the Mahratta territories of the province of Khandesh, forty-six miles east from Surat. Long. 73. 45. E. Lat. 21. 6. N.

NOX, in fabulous history, one of the most ancient deities amongst the heathens. She was daughter of Chaos, and from her union with her brother Erebus she gave birth to the Day and the Light. She was also the mother of the Parcae, Hesperides, Dreams; of Discord, Death, Momus, Fraud, &c. Nox is called by some of the poets the mother of all things, of gods as well as of men; she was worshipped with great solemnity by the ancients, and had a famous statue in the temple of Diana at Ephesus. It was usual to offer her a black sheep, as she was the mother of the Furies; and a cock was also presented to her, as that bird proclaims the approach of day during the darkness of the night. She is represented as mounted on a chariot, and covered with a veil bespangled with stars. The constellations generally went before her as her constant messengers. Sometimes she is seen holding under her arms two children, one of which is black, representing Death, and the other white, representing Sleep. Some of the moderns have described her as a woman veiled in mourning, crowned with poppies, and carried upon a chariot drawn by owls and bats.

NUAYHAS, or AGUE TREE, a name given by the Indians to a sort of bamboo cane, the leaves of which falling into the water, are said to impregnate it with such virtue that the bathing in it afterwards cures the ague. To dissolve coagulated blood, they use also a decoction of the leaves, giving it internally, and at the same time rubbing with it the bruised part externally. It is said that this plant bears

Nuba
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Nubia.

its flowers only once in its life; that it lives sixty years before the flowers make their appearance; and that, when they begin to show themselves, it withers away in about a month afterwards, that is, as soon as it has ripened the seed. There appears to be something of fiction in the account given of this tree in the *Hortus Malabaricus*; but it seems certain, that the length of the stalk, or trunk, must be very great. In the gallery of Leyden there is preserved a cane of nuayhas twenty-eight feet long; and another not much shorter, and more than eight inches in diameter, may be seen in the Ashmolean Museum at Oxford.

NUBA, a race of black Pagans, in the neighbourhood of Sennaar, of whom we know nothing, except what has been stated by Bruce. That traveller passed a day or two amongst them in his way from Abyssinia; and he tells us that they are all soldiers of the *melek* or king of Sennaar, cantoned in villages, which surround the capital to the distance of four or five miles. They are not the aborigines of that part of Africa; but are either purchased or taken by force from Fazuclo, and the provinces to the south upon the mountains Dyre and Tegla.

The idolatry of the Nuba is described as a mixture of Tsabaism and statue worship; but what is very uncommon, their worship is chiefly addressed to the moon, whilst they pay no attention to the sun either rising or setting, advancing to the meridian or receding from it. It is an old observation, that the worship of every people is tinged by their natural dispositions; and this is verified in the case of the Nuba. "That their worship is performed with pleasure and satisfaction, is obvious," says Bruce, "every night that the moon shines. Coming out from the darkness of their huts, they say a few words upon seeing her brightness, and testify great joy, by motions of their feet and hands, at the first appearance of the new moon." This is just what we should have expected from their gentleness and hospitality. They likewise worship a tree and a stone, but our author could never discover what tree or what stone; he only learned that neither of them exists in Sennaar, but in the country where the Nuba are born. Such of them as are natives of the villages where he saw them, become, like their masters, nominal Mahomedans.

NUBIA, an extensive country of Africa, bounded on the north by Egypt, on the south by Abyssinia, on the east by the Red Sea, and on the west by the great Libyan desert. It is difficult to fix the precise limits and extent of this vast region, which will be variously estimated, according as we confine Nubia to the mere valley of the Nile between the first cataract and Meroë, or take into the account, as ought certainly to be done, the adjacent desert. There is, in fact, no principle of unity according to which it can be described as a whole; but, looking rather to the country itself than to any arbitrary definition or limitation, it may be considered as included between the thirteenth and twenty-fourth degrees of north latitude, and the thirty-third and thirty-sixth degrees of east longitude, and consequently as having a superficial area of not less than 360,000 square miles.

With the exception of the immediate banks of the Nile, which are rendered partially productive by laborious irrigation, Nubia consists almost entirely of rocky and sandy deserts. From the southern boundary of Egypt to Derr, the capital of Lower Nubia, the mountains press so closely upon the river, that there is but little ground upon either side for the purposes of agriculture; and the small portion which is capable of being cultivated appears to be diminishing, from the gradual encroachment of the sands, which the winds of the desert carry towards the stream. The peculiar structure of the valley through which the Nile here forces a passage, renders it obvious that there could not at any period have been a very dense population in this part of Nubia. But farther up the river, beyond the

Boundaries and extent.

General character of the country.

Nubia. parallel of Wady Halfa, there is ample space for the powerful nations which are said to have flourished here in ancient times. At the second cataract immense plains stretch out from either margin of the stream, exhibiting, it is said, even in their present neglected condition, unequivocal indications of fertility; and as there seems to be little doubt that, in former ages, the annual inundation extended considerably beyond the limits of modern cultivation, so it may reasonably be presumed that, anciently, the country was much more productive and populous than in modern times, when the decrease of the inundation, and the continual encroachment of the moving sands on the side both of the Nubian and the Libyan deserts, have combined to produce the desolation which now prevails. At present the Nile seldom or never overflows its banks in this part of Nubia; and the portion of the soil cultivated is irrigated by means of *sakheas* or Persian wheels, constructed for raising the water of the river to the level of the adjacent ground. The eastern bank of the Nile is much better adapted for cultivation than the western, being more easily irrigated by artificial means. But it is not a little remarkable, that all the splendid ruins for which this region is distinguished, and which exhibit so great labour, ingenuity, and skill, are found upon the opposite bank; a circumstance which seems to strengthen the presumption that Nubia was formerly much more fertile and populous than in the present day.

Division of
Nubia.

The country on the banks of the Nile is divided into a number of little independent principalities, each governed by its own *melek* or chief. But, taken as a whole, it is composed of two parts; Wady Kenous, and Wady Nouba. The former extends from the confines of Egypt on the south to Wady Seboua; and the latter, from which the general name of the country appears to have been derived, stretches as far as the frontier of Dongola. The chief distinction between these two parts consists in the circumstance, that the languages spoken in each are entirely different. The governors of the various districts are described as ferocious and arbitrary in their proceedings; rude in their treatment of strangers, whom they regard with suspicion; and addicted to most of the vices which are common amongst barbarians. They acknowledge a nominal subjection to the viceroy of Egypt, but seldom neglect any opportunity that offers of setting his authority at naught. Still, under the safeguard of his firman, Europeans may travel as far as Ibrim (the ancient *Primmis*) in perfect safety; but, beyond that point, they must lay their account with being exposed to the vexations and dangers usually incurred in visiting barbarous countries, especially in Africa. In the marauding, slave-hunting expedition of Ismael Pasha in 1821, the treatment which the natives everywhere experienced has had the effect of exasperating and confirming the hostility of all the tribes who inhabit the upper parts of Nubia; nor is it likely that the remembrance of the wanton aggression which was then made upon them will soon be effaced from their memories. Each of the Nubian sheicks pays an annual tribute to the viceroy of Egypt; or rather a certain sum is extorted as an acknowledgment of subjection, and the price of an immunity from a visit by the viceroy's troops.

Productions.

The grain which forms the principal object of Nubian cultivation is *dhourra*, the *holcus arundinaceus* of the botanists. It is raised upon the patches of soil irrigated by means of the *sakheas* or Persian wheels, of which there are from six to seven hundred between the first and second cataracts; and, when ground, it is formed into a cake somewhat resembling the Abyssinian *teff*. But as the people have no mills of any kind wherewith to grind it, this is usually effected by placing the grain in small quantities upon a large stone, and rubbing a smaller one over it until it is reduced to a sort of flour. If it be intended to produce bread of a superior quality, the *dhourra* is well washed, and then dried in the sun. But in general the people do not

take this trouble; and the meal produced by their rude mode of grinding resembles a paste of the coarsest kind, mixed with chaff, sand, and dirt. It is usually placed in an earthen jar, and there left to ferment during twenty-four or thirty hours, after which time it acquires a subacid taste. No leaven is formed. A portion of the fermented pulp is merely poured upon an iron plate or stone placed over a fire, and in a few minutes it is baked into a cake; and this is repeated till the whole be baked. Cakes are usually brought hot to table, in a wooden bowl, with onion sauce, broth, milk, or butter poured on them; but some of a thinner kind, and well toasted, are prepared for the use of the caravans, and may be kept without being spoiled for several months. After the *dhourra*, the Nubians raise a crop of barley, French beans, lentils, and sometimes also of water-melons. Tobacco is everywhere cultivated, and constitutes the principal luxury of all classes, being either smoked, or sucked in a peculiar manner between the gums and the lip. Animal food is scarce, and seldom eaten, even by the chiefs or sheicks. The liquors used are palm wine, a spirit distilled from dates, and a sort of beer called *bouza*, which is made from *dhourra*. Excessive indulgence in these liquors is general throughout the whole country. The only fruit trees cultivated in Nubia are palms, but the soil is adapted for several others. Great sameness prevails in the vegetation of the desert, the trees being mostly *acacias*, *tamarix*, date, and *domm* palms.

Nubia.

The climate of Nubia, though intensely hot in summer, is nevertheless remarkably healthy. This is no doubt a consequence of the extreme dryness of the atmosphere, occasioned by the absence of rain, and the absorbent qualities of the soil. The plague has seldom or never reached Wady Halfa, and beyond the second cataract it is entirely unknown. The small-pox, however, is a fearful scourge, and, owing to the ignorance and filthiness of the people, occasionally commits dreadful ravages. The houses of the Nubians are constructed of mud or of loose stones. The mud huts are roofed with *dhourra* stems or palm leaves, which in this climate are found to be a sufficient covering. The houses which are built of stones, being for the accommodation of the better class of inhabitants, commonly consist of two compartments, one for the male and the other for the female members of the family. The utensils of a Nubian household are few and wretched; half a dozen coarse earthen jars, some earthen plates, two stones for grinding *dhourra*, and a few round sticks, usually constituting their whole stock. From this an idea may be formed of the miserable condition of the inhabitants, as compared with those of any other country, Egypt only excepted.

Climate.

Still the Nubians are generally well made, strong, and muscular, and have tolerably good features. The women are not handsome, but perfectly well formed, and in general remarkable for agreeable countenances and pleasing manners. They are also modest and reserved, and strictly observant of their conjugal duties. The domestic employments of the women consist chiefly in weaving coarse woollen mantles, cotton cloth for shirts, and mats of the date leaves; they also make drinking-bowls, and plates for containing the *dhourra* bread. A linen cap and a woollen cloth or mantle constitute the dress of the rich. The women usually wrap themselves in black woollen gowns; but children of both sexes run about quite naked. In ascending the Nile to Sukkat and Mahas, the dress becomes more and more scanty, and at length almost entirely disappears. The Nubians are seldom seen unarmed; indeed the first purchase made by a boy is that of a short crooked knife, which being fastened at the left elbow, is ready to be drawn on the slightest quarrel. Fire-arms are not common, and ammunition is very scarce. The inhabitants of the two divisions of Nubia, Wady Kenous and Wady Nouba, are almost constantly engaged in sanguinary quarrels; and when

Population.

Nubia.

death ensues, as is not unfrequently the case, the family of the deceased may either demand the price of blood, or retain the right of retaliation, which may be enforced against the brother, son, or first cousin of the murderer, at the option of the avenger. The consequence of this is, that when a death has occurred in any of these quarrels, a whole family is often obliged to leave the country. Great numbers of the Nubians repair to Cairo, where they usually act as porters, and are esteemed for their honesty; but they always return to their native villages with the little property which they have saved in plying their humble vocation. The inhabitants of Derr-el-Mahas and the more southerly districts differ considerably from the other Nubian tribes. Their houses are constructed only of palm leaves, fastened to high poles, the extremities of which rise considerably above the roofs. The countenances of the people are much less expressive of good nature than in the lower parts of the country, and their character corresponds with this difference of expression. In colour they are perfectly black, and their lips are thick like those of the negro, but they have not the same flat nose and high cheek-bones. A number of the men, and even girls who have attained womanhood, go about quite naked. Burckhardt has described the king of the Mahas as a mean vulgar-looking black, attended by some half dozen naked slaves, armed with shields and lances. Mahas is the nearest place in the country of the blacks, from which slave traders proceed to Cairo, a distance of about a thousand miles.

Tract between the Nile and the Red Sea.

There is another part of Nubia which is well deserving of particular notice; we mean the vast tract of country extending from the Nile to the Red Sea, between the parallels of 23° and 15° of north latitude. Modern travellers have penetrated this extensive region only by one line, namely, that which is followed by the Nubian caravans proceeding from Egypt to Sennaar. It is described as throughout a complete desert, without even a single fixed habitation, but interspersed with *wadys* or valleys, producing some trees, shrubs, or grass, and usually containing a few wells or rills, which are resorted to by the wandering Arabs, and also by the caravans, for a supply of water. The want of this important article forms the chief danger attending the journey; but if due precautions be taken, and the water-bags be properly filled at the wells, travellers can never be reduced to a state of great suffering, as many days seldom elapse without the means of obtaining a supply. Burckhardt, after having passed through the deserts of Suez and Sinai, did not consider this tract as quite so dreary, although its aspect is much more rugged, being in general hilly. At the southern extremity of this desert, through which roam the Bishareen tribes, is the district of Berber, consisting of four large villages, the inhabitants of which are chiefly employed in carrying on the trade of Egypt and Arabia with the interior of Africa. The people are a very handsome race, of a reddish-brown colour; which, if the mother be a slave from Abyssinia, becomes a light brown, but if from the negro countries, extremely dark, indeed almost black. The men are somewhat taller than the Egyptians, and also better limbed, and more muscular. Their features bear no resemblance to those of the negro; the face being oval, the nose often perfectly Grecian, and the cheek-bones by no means prominent. They consider themselves as Arabs, not negroes, and are very careful in maintaining the purity of their race. A free-born Meyrefab never marries a slave, whether Abyssinian or negro, but always an Arab girl belonging to his own or to some neighbouring tribe. Few men have more than one wife; but every one who can afford it keeps a female slave or mistress, either in his own or in a separate house; and traders passing through Berber usually take a mistress during the period of their stay in the district. Drunkenness is the constant companion of this debauchery; and these dissolute habits produce the most per-

Nubia.

nicious effects on the morals and conduct of the people. Their character indeed is deformed by every degrading and debasing vice; they are noted for treachery and dishonesty; in the pursuit of gain they are restrained by no principle, breaking without scruple the most solemn engagements; and in transactions amongst themselves they commonly terminate every dispute by the law of the strongest. Quarrels are frequent and violent at drinking parties, and mostly end in bloodshed either with the knife or the sword. The principal scenes of these disorders are the *bouza* huts, which are kept by women of infamous character, by whom the liquor is also manufactured. Indeed no one ventures to enter one of these without his sword, and several persons of distinction have been killed in them. In a word, it is marvellous that a people so completely abandoned to the dominion of the most brutal passions have not long since been consumed by their own vices. Another part of this territory is the district of Taka, inhabited by the Bishareen Arabs. It is comparatively populous and fertile, differing in many respects from the other parts of Nubia; and through it passes the road to Souakin, followed by Burckhardt, the first who made us acquainted with Taka.

The government of Nubia, like that of Egypt, is essentially military. The officers, all of whom are Turks, decide every question connected with the revenues, and frequently interfere, in other affairs, with the decisions of the cadis or civil judges. The system of the government is to extort from the peasant the utmost possible amount in the shape of taxes, leaving him only what is considered a sufficient subsistence, which, as might be expected, is usually a most miserable one. In some places, indeed, if the peasants did not actually steal from their own fields, they could not exist; and although they bury their grain under ground, and by various other methods deceive their oppressors, yet numbers perish from the want of sufficient sustenance and clothing. A vast proportion of the peasants subsist on food which is more calculated for cattle than human beings; and even of this, bad as it is, they have rarely enough. The pasha has power enough to keep them in subjection, and by his extortions fills his coffers. He not only imposes enormous taxes on every article of produce, but obliges the people to cultivate whatever he chooses, and to take the price which he offers for the produce. He is the only purchaser of the grain, cotton, and indigo, the gum of Kordofan, ostrich feathers, and other articles. Slaves are almost the only commodity which the merchants are allowed to take in exchange for the manufactures which they carry to Kordofan and Sennaar; and even the wild animals of the desert, as the giraffe, form a government monopoly. The pasha is also the landlord or proprietor of this immense region; and the people are his slaves. His revenues are derived not only from the regular taxes, but likewise from his profits as a merchant, which are enormous, owing to the low rate at which he pays the peasants for their produce, compared with the high price at which he afterwards sells it to Europeans. This source of gain, however, is greatly diminished by the roguery of the different officers through whose hands the various commodities pass. From the highest to the lowest there is no exception in this respect; mahmours, nayrs, kiachefs, caimacans, and mallums or Coptic accountants, all concur in diminishing the amount, and sharing the plunder of the unhappy peasantry. The Copts employed in this department not only cheat the ignorant Turks, who generally cannot read their accounts, but often trade with the money of the treasury, and sometimes incur losses they are unable to make good; on which account numbers of them are always immured in the prisons of the viceroy.

But the peasants in Upper Nubia are free from these exactions, and therefore comparatively happy. It is no doubt true, that, instead of one dollar in money, two pieces

Condition of the people in Upper Nubia.

Nubia. of linen cloth, and a sheep, which was all they paid their ancient meleks, they are now obliged to pay fifteen dollars in cash and five in grain, being in all three hundred piastres, or ten times the amount of their former contributions; and they are likewise obliged to work instead of sleeping during the greater part of the day, as was formerly their custom when under their own chiefs. But the man who is at all industrious may nevertheless earn what is amply sufficient to afford him food, and such dress as he has been accustomed to. Each sakkea or Persian wheel is sufficient to water three quarters of a feddan of land, planted with indigo; and each feddan, when carefully irrigated, produces a hundred cantars of the herb, and sometimes more, being about seventy-five cantars for the extent of land which one wheel will water. The government pay the peasant $12\frac{1}{2}$ Egyptian piastres for each quintal, or 937 piastres for the whole; which, at the current rate of the dollar in this country (fifteen piastres), is equal to $62\frac{1}{2}$ dollars. If from this we deduct twenty dollars for the duty, there remains for the persons to whom the wheel belongs $42\frac{1}{2}$ dollars, or 637 piastres; but as the calculation here made is at the lowest rate, two piastres a day may fairly be estimated as the clear gain of the peasantry by each water-wheel. This sum, small as it may appear, is sufficient for the support of one family, provided it contain five persons capable of putting their shoulders to the wheel; if it do not, however, two families must unite to make up this number. The immense expense of the water-wheel forms a great deduction from the gain of the peasant in Egypt; but in Nubia they are so much more simple that they cost only a trifling sum, as oxen may be obtained for thirty piastres each, whilst their "keep" is next to nothing. Two piastres, or sevenpence sterling, may appear a very small sum to a European; but in this country, where every necessary is so cheap, it is amply sufficient for the support of a family. In both divisions of Egypt, where bread is much dearer, and meat and milk are double the price, the fixed remuneration of a labourer amounts to only half a piastre per day, with which he has to sustain himself and perhaps a family. But in Nubia most of the peasants have slips of land watered by the partial inundation of the river, and gain considerably by their date trees, although they pay a tax of a piastre for each. They also rear flocks; cultivate vegetables, particularly bamia and malakhia; and make linen, spirit, bouza, and other articles. The condition of the peasants of Upper Nubia is therefore happy, compared with that of the Fellaheen of Egypt, the most oppressed and degraded population in the world.

The Arabs of the desert. The Arabs of the desert have still more reason to be satisfied with the government. They pay tribute only for the land they cultivate, which is in general very little, and in many cases none at all; and otherwise they gain a sufficient livelihood by transporting to Egypt on their camels the grain collected as revenue, or purchased by the government, and by aiding the passage of troops and merchants, which is now unintermitted. As far as regards taxes, and the means of subsistence, therefore, the Arabs of the desert in Upper Nubia, as well as the peasants on the Nile, are in a much better condition than the Fellaheen of Egypt. But in all other respects they are equally galled and insulted by their Turkish rulers. In Egypt, the officers only are oppressive, and the soldiers, who mostly belong to the class of Fellaheen, are not insolent. In Nubia, however, it is far otherwise. The comparatively white complexion of the troops, their character as conquerors, and their pride as *askaria* (soldiers), induce them to despise the natives, and exercise oppressions which the government by no means authorizes. When the chief go-

vernor of a province is a man possessed of talent, energy, and firmness of character, the officers and soldiers are prevented from committing many excesses. But when the country has the misfortune to be governed by an individual destitute of the qualities we have mentioned, and too timid to redress the grievances occasioned by the disorderly conduct of the troops, its state may easily be imagined. Every evil is then aggravated by impunity. Men whose ancestors have been meleks or chiefs in the country for ages, are obliged to submit to the insolence and tyranny of a lawless soldiery. Taxes oppressive in themselves are rendered tenfold more so by the mode in which they are levied. Every collection is a species of military execution. No proper notice is almost ever given. "Pay to-morrow, or the bastinado," is the usual intimation conveyed to the peasant, who, not being allowed sufficient time to raise the money, is subjected to this cruel and degrading punishment, and sometimes nailed by the ear to a board. The revolt of the Mahas, described by Mr Hoskins, was occasioned by this summary mode of collecting some arrears of taxes.

Nubia, under proper management, might become a far greater source of wealth to the ruler of Egypt than it now is, or seems likely to be, under his sway. His system is one which is not only calculated to defeat its own objects in a fiscal point of view, but to exasperate the natives, whom good policy would try to conciliate, and also to sow the seeds of future anarchy and convulsion. At the same time, notwithstanding the galling conduct of the Egyptian authorities, the natives are sensible of the advantage of a firm and settled government; and the peasants of the Nile, in particular, are glad to be released from the tyranny and spoliation which accompanied the feuds and petty wars by which the country was formerly distracted. "Did the Turks," says Mr Hoskins, "but treat them as men, and not disgust them by their insulting manners, and by inflicting on them such degrading and infamous punishments; had their rulers but a few ideas of common policy and legislation; the resources [of the country] might be greatly augmented, the revenue increased, and the people the most happy and contented under the sun. The superiority which fire-arms afforded to their haughty conquerors taught them to despise the strength of the Arabs; and, with that insolence which is ever united with ignorance, they do not, in the slightest degree, endeavour to attach them to the government, or, in fact, condescend to treat, otherwise than as a vastly inferior race, the people whom it cost them so much, with all their advantages, to conquer."¹

The chief trade of Nubia, as already mentioned, consists in slaves imported from the interior of Africa, and either conveyed northwards to Egypt, or sent across the Red Sea from Souakin to Jidda. The annual import is estimated at about 5000, of whom 2500 are for Arabia, 1500 for Egypt, and 1000 for Dongola and the Bedouins of the mountains. Few of the slaves are above the age of fifteen; but the most valued are those between eleven and fifteen, who, if males, sell for fifteen or sixteen dollars, and if females, for twenty-five or twenty-six. In the East, slaves are chiefly employed as domestics, and people are seldom fond of any who have not been in the family from an early age. These children, as long as they remain within the negro territories, are treated with great indulgence; but when they once enter the desert, and have no longer any chance of escape, this treatment is entirely changed, and the lash unsparingly applied. The health of the slave, however, is always attended to; he is regularly fed, and receives a share of water with his master. Dates, gums, and ostrich feathers are also exported; as are senna leaves, ebony, sandal-wood,

¹ Hoskins, Travels in Ethiopia, pp. 230, 236.

Nubia. and some other articles, though in small quantities. Gold is found in mines, and amongst the river sands, but not in such abundance as to form any considerable article of exchange.

Monumen- One of the most remarkable features of this region consists in the magnificent monumental remains with which it is covered along the line of the stream, and which continue to perpetuate the genius and power of the ancient population of the country situated on the Upper Nile. That Egypt was indebted to Ethiopia (which included Nubia) for the rudiments, and perhaps even for the finished patterns, of architectural skill, is no longer questioned by any writer whose pursuits have qualified him to form a judgment of the subject. Gau, in his splendid work on Nubia, maintains it as a first principle, that this country was the cradle of Egyptian architecture; and its monuments embrace the whole period during which the art flourished in the valley of the Lower Nile. He conceives that all the architecture of Egypt, from the first rude effort to cut a temple in the rock, to the construction of those detached edifices which were afterwards erected in the times of the Greeks and Romans, has its types in the structures of Nubia. Hence, in the architectural history of that country, he distinguishes three great epochs; the first comprehending the temples cut in the sides of the hills or rocks, which are evidently the most ancient; the second, those which are detached from the chambers cut in the rock, but still retain the colossal masses of the primitive type; and the third, the small edifices of Maharraga, Gartaas, and Dondour, with several analogous structures in Egypt. This classification appears to be perfectly natural and well founded, inasmuch as the only test of the relative antiquity of such monuments is a reference to the comparative simplicity of their structure or formation. It is upon this principle, therefore, that we shall now proceed to describe very shortly, some of the principal temples and other edifices in Nubia.

Temples of Gibel-el-Birkel, &c. At Gibel-el-Birkel, Waddington discovered two temples excavated in the solid rock, and having only their exterior chambers formed of masonry; circumstances in which they resemble those of Girshé, Seboua, and Derr. The smaller of the two has six halls or apartments, five of which are cut in the body of the mountain; the larger, constituting the entrance, stands on an artificial foundation of stone, by means of which it is raised as high as the rock in which the other is excavated. Near the adytum there are figures of Ammon and of Horus; and vestiges of hieroglyphics may be discerned in all the chambers. From the plainness of the masonry, the rudeness and decay of the sculptures, and the decomposition of the walls, it has been concluded that this is older than any of the temples of Egypt, or even of Nubia. The temple of Girshé also belongs to the more simple order of structures, and indicates a rude state of the arts connected with architecture. The portico consists of five square columns on each side, cut out of the rock, with a row of circular pillars in front, constructed of several blocks, and originally surmounted with an entablature, though only two of them now remain. Before every one of the square columns stands a colossal statue of sandstone, eighteen feet in height, holding a lash or flail in one hand, and the other hanging down; the figure of each is that of a male, with the pointed beard under the chin, the high sphinx-cap on the head, and the shoulders covered with hieroglyphical inscriptions. On both sides of the portico

there is an open alley, which is hewn in the rock. The pronaos, eighteen yards square, is entered from the portico, and contains two rows of immense columns without capitals, in front of each of which there is a colossal figure, more than twenty feet in height, with the hands crossed on the breast, and holding the flagellum in one, and the handled cross, or emblem of life, in the other. On the side walls are four recesses or niches, in each of which are three statues of the natural size, representing the different figures, male and female, which are observed upon the walls of the temples of Egypt. A door leads from the pronaos into the cella, in the middle of which there are two massive pillars, and, upon either side, a small apartment. Very little is now discernible of the sculpture and hieroglyphics with which the walls were covered; but enough remains to show that they were very rudely executed.¹ The ruined structure at Seboua has before it a propylon similar to that of Gourneh at Thebes. The pronaos on each of its longest sides has five columns without capitals, and in front of each is a colossal figure, sixteen feet in height, with the arms crossed on the breast, and the usual emblems in the hands. Before the entrance there lies on the ground a huge statue, the head and bust of which are buried in the sand; and in front of the propylon are two statues, ten feet in height, with their faces towards the river, and attached by the backs to stone pillars of equal elevation. An avenue of sphinxes leads from the bank of the Nile to the temple, but the greater part of them are now buried in the sand, four only remaining visible. The whole fabric appears to be of the remotest antiquity, and has been imitated by the more modern architects of Egypt.²

But of all the rock temples of Nubia, that of Ebsamboul Temple of or Ipsamboul,³ about a day and a half's journey below the Ebsamboul. second cataract, is incomparably the most remarkable. In the course of centuries the sand of the desert had so completely overwhelmed it, that nothing appeared to the eye of the traveller except the bust of one of the colossal figures which were placed at the front of the entrance. But the dimensions of this statue were so great as to excite the curiosity of all who examined it; and the countenance, when seen at a proper distance, appeared strikingly beautiful. Animated with a desire to explore the buried structure of which this statue formed an exterior ornament, a party, consisting of Mr Belzoni and Captains Irby and Mangles, with some attendants, undertook to remove the sand, so far at least as to ascertain whether there was a door-way, or any other access to the interior. At first they relied upon the assistance of the natives, who readily entered into terms with them; but the increasing fatigue, and an evident disinclination to the work, induced the Nubians to break their engagement, and the travellers had no resource but to complete the labour with their own hands. In the hot season of the year, and with a scanty supply of necessaries, they worked day by day in the sand, from sunrise till night; and at length, after more than three weeks of continued exertion, each performing the labour of about a dozen Nubians, a corner of the door-way became visible; and an entrance having been effected, the interior was explored, probably for the first time during a thousand years.

The first glance at the interior convinced Belzoni and his associates that it was evidently a very large structure; but their astonishment increased when they found it to be one of the most magnificent of temples, enriched with

¹ This is the same place which by other travellers is called Guerfeh Hassan, or Gwersh Hassan, and is described with much minuteness in several of their works. (See Henniker, Notes, &c. p. 154.)

² The propylon and pronaos are found, on a large scale, at Gourneh, near Thebes; the two statues in advance of the propylon are the miniatures of those in front of the Memnonium; and the sphinxes are seen at Karnak.

³ The name, as spelled by Belzoni, is *Ybsamboul*, whilst others write it *Ebsamboul* and *Ibsamboul*. But all these forms are probably corruptions of *Abou-Samboul*, which appears to be the genuine name.

Nubia. beautiful intaglios, paintings, and colossal figures. The pronaos, fifty-seven feet in length, and fifty in breadth, is supported by two rows of square pillars in a straight line from the front door to that of the sekos; and each pillar has attached to it a figure finely executed, and very little injured by time, the top of the head-dress reaching the ceiling, which is about thirty feet in height. Both the pillars and the walls are covered with representations of battles, storming of castles, triumphs, and sacrifices, in a style, if not superior to, at least bolder than, that of almost any in Egypt, both in regard to the design and the workmanship. The second hall, which is of less dimensions, contains four pillars about four feet square, and the walls are covered with hieroglyphics in tolerable preservation. Beyond this there is a chamber of the same width, but shorter, in which is the entrance to the sanctuary; and at each end is a door leading into smaller apartments in the same direction with the adytum. The sanctuary itself is twenty-three feet in length by twelve in breadth, and contains a pedestal in the centre, with four colossal figures in a sitting posture at the end, all in good order, and uninjured. On the right side of the great hall there are two doors at a short distance from each other, and which lead into two separate apartments of considerable dimensions, at the end of which are several unfinished hieroglyphics, sketched so as to give an idea of the manner of drawing. At the lateral corners of the entrance from the first into the second chamber are doors, each of which leads into a chamber twenty feet by ten; and these again open into other apartments, forty-three feet in length by eleven in breadth. The most remarkable subjects in this temple are a group of captive Ethiopians in the western corner; a hero killing a man with his spear, and another lying dead at his feet; and the storming of a castle, which forms part of the representation. The outside or external front of this temple is truly magnificent, being a hundred and seventeen feet in width, and eighty-six feet in height, whilst the space from the top of the cornice to that of the door is sixty-six feet and a half, and the height of the door itself twenty feet. There are four enormous sitting figures, the largest in Nubia, or even in Egypt, excepting only the great sphinx at the Pyramids, to which they approach in the proportion of nearly two thirds. On the top of the door is a statue of Osiris, twenty feet in height, with a colossal figure on each side looking towards it. The cornice of the temple is adorned with hieroglyphics, and under it are a torus and frieze, the one six and the other four feet in breadth. Above the cornice is a row of squatted monkeys, twenty in number, and each eight feet and a half across the shoulders. This temple was nearly two thirds buried in the sand, of which thirty-one feet were removed before reaching the upper part of the door. It is excavated in the solid rock, which here rises about a hundred feet above the Nile, and, excepting one of the tombs at Biban-el-Molouk, is the largest of the kind either in Egypt or Nubia.¹

At a subsequent period, Mr Bankes visited Ebsamboul, and succeeded in uncovering down to the feet one of the four colossal sitting figures, upon the limbs of which he discovered and copied an inscription in Greek relating to Psammeticus. He next cleared the head of the fourth colossal figure, which had not before emerged above the surface, so as to be able to make a drawing of the whole; and the approach being thus disencumbered, the interior of the temple was lighted up with wax candles fixed on upright poles, to enable Mr Bankes and his assistant draughtsmen to copy all the paintings in detail. It is much to be

regretted that the labour in opening this temple has not been attended with any permanent effect; the winds of the desert and the natural lubricity of the sand having soon rendered the approach nearly as difficult as before. In about two years the door-way was again covered up, and by this time the interior must be quite as inaccessible as ever. All travellers agree in the accounts they give of Ebsamboul, which is described as the *ne plus ultra* of Egyptian labour. According to Sir Frederick Henniker, there is no temple at Denderah, Thebes, or Philae, that can be put in comparison with it; and the traveller just named rejoices in "having seen the noblest monument of antiquity that is to be found on the banks of the Nile." This is not the place to enter into details respecting the hieroglyphical emblems and inscriptions with which different parts of this wonderful structure are covered. The larger chamber is distinguished as the temple of Osiris, and the smaller as that of Isis, to whom it is dedicated. The former is represented in a sitting posture, attended by the hawk-headed deity; whilst the latter holds in her hand the lotus-headed sceptre, surrounded with numerous inscriptions and emblems. Much interesting sculpture is also lavished upon the second and third apartments; and in a niche at the upper end of the latter is a small statue of Nephthe, the wife of Typhon, seated. In several places of the square border which encircles the front of the temple, and also on the buttresses between the colossal figures, are a number of ovals or rings, containing the name and prænomen of Ramesses the Great, the same Pharaoh whom the Greeks indicate by the name of Sesostris or Sethosis. We may here add, that a striking resemblance has been observed between the rock temples of India, particularly that in the island of Elephanta, and those of Nubia, especially that of Ebsamboul; indeed the similarity is so great as to have suggested the notion of a common origin, as well in regard to the mythology as the architecture of both countries.²

The temple of Samneh, situated on the western bank of the river, between the twenty-first and twenty-second degree of north latitude, affords a specimen of a more perfect class of structures; intermediate, it would seem, between such excavations as that of Ebsamboul and the magnificent edifices of Karnak and Luxor. It is built of sandstone, and differs in shape from other edifices of a similar kind, though in its plan it somewhat resembles the small chapel at Elephantina in Egypt. The principal building is about thirty-six feet in length and nine in breadth. On either hand there stood originally four small pillars, of which two remain on the one side, and three on the other, all covered with sculptures. The inner walls are adorned with hieroglyphics and mystic representations, amongst which may be mentioned the ship of Osiris; and upon the outer wall Burckhardt's distinguished figures of Mendes. The sculptures are rather coarsely executed, and the lines dividing the columns of hieroglyphics, some of which have been left unfinished, are not straight. The temple of Dondour or Tangour is likewise deserving of attention, from the peculiarities of its style, having been classed by Gau amongst those structures which belong to the last of the epochs of Nubian art already mentioned. It is in form a parallelogram, having the proportions observed in some Grecian structures; and in the pillars may be recognised the mixed Greek and Egyptian style. Between the second and third cataract, in latitude twenty-one degrees north, is the temple of Soleb or Solib. An elevated stone foundation extends in front of the temple, and the remains of two sphinxes are seen at either side of the approach. The first

¹ "The heat was so great in the interior of the temple," says Belzoni, "that it scarcely permitted us to take any drawings, as the perspiration from our hands soon rendered the paper quite wet. Accordingly, we left this operation to succeeding travellers, who may set about it with more convenience than we could, as the place will become cooler." (Narrative, p. 214.)

² See Erskine's Account of the Cave-Temple of Elephanta, in the Transactions of the Literary Society of Bombay, vol. i. pp. 210, 249.

Nubia.

chamber is more than a hundred feet in breadth, and about ninety feet in depth, having round three of its sides a single row of pillars, and on the fourth indications of a double row. They have all been executed from the same model, and are inscribed with hieroglyphics. In the second chamber may be traced a row of pillars, resembling those of the first; but they are all broken, and the fragments scattered about in every direction. The dimensions of the adytum cannot now be ascertained, the side walls having been completely destroyed. The temple of Soleb affords the lightest specimen anywhere to be seen of Ethiopian architecture, and, for elegance of proportion, has been compared to that of Minerva Sunias at Cape Colonna. At Gibel-el-Birkel there are the remains of two temples, partly excavated in the rock, and partly constructed, like those of Girshé and Seboua. The principal temple is of vast dimensions, and contains no less than six chambers. It is supposed to have been the work of different and distant periods; and, even in the construction of those parts which belonged to the original building, many stones were employed which had formed parts of some more ancient edifice. The vicinity of Gibel-el-Birkel is remarkable for pyramids, which, though much inferior to those of Egypt, probably originated in the same views of vanity or superstition, not to say tyranny. For further information on the subject of Nubian rock excavations and architecture, the reader is referred to the works of Burckhardt, Light, Legh, Richardson, Henniker, Caillaud, Waddington, and Hoskins, in which will be found ample descriptions of the remains on either side of the Nile, from Assouan to Meroë, accompanied occasionally with drawings and plans. The reader is also referred to the articles ETHIOPIA, ETHIOPIAN NATIONS, and MEROE.

General deductions.

On the whole, it appears that, by a more accurate classification of the monuments, and the aid of inscriptions, which to former travellers were altogether unintelligible, we are now enabled to rectify misconceptions, correct mistakes, discard mere conjectures, and, in fact, make a real and valuable addition to the history of civilized Egypt. Between the temples excavated in the rock, such as those of Derr and Ebsamboul, and the buildings of a later date, there was an intermediate stage in the art, which it is important to distinguish. The first architectural attempt in Nubia probably consisted in the improvement of some hole or cave in the rock; or, even if the country possessed no natural caves for imitation by a people possessing the troglodyte habits natural to the inhabitants of a burning climate, the mountains themselves would afford facilities for constructing durable habitations. After having got possession of a hole or cave, the next step of these primitive architects would probably be to extend the excavation, to form several chambers separated by the native rock, and when a compartment of larger dimensions was designed, to have square pillars for the support of the roof. In the course of time the outer front, with the inner walls and pillars, would receive decorations derived from imitations of the natural forms of the country, and subjects connected with the historical remembrances or religious creed of the nation. We see abundant evidence in the rock temples of Nubia to convince us, that the order of progression and improvement here indicated was that actually followed in their gradual enlargement and decoration; yet a prodigious period must have elapsed between the rudest excavation in the rock, such as Derr appears to have been in its primitive state, and the highly-finished sculptures of the great temple of Ebsamboul. In fact, "antiquity appears to have begun" long after these primeval architects had commenced their troglodyte labours. But, in surveying the wonders which crowd the banks of the Nile from Meroë to Memphis, our minds become insensibly impressed with the reflection, that the wealth, power, and genius which produced them have entirely passed away; that, if

the new worlds have risen, and new races been discovered, "we have lost old nations;" and that, in the lapse of ages, empires themselves vanish, like the baseless fabric of a vision, leaving scarcely a wreck or trace behind them. Throughout many parts of this extensive tract, a race little superior to savages pass a rude and precarious life, ignorant of the arts which once flourished in their country, and insensible to the beauty and magnificence of the ruins which they desecrate. They have long ceased to claim any connection with the people who constructed the monuments of Ebsamboul, Karnak, Luxor, and Gourneh; and having relapsed into that low condition where curiosity becomes dormant or extinct, they are only moved with wonder when they observe the natives of civilized regions exploring their temples, or taking the dimensions of their obelisks and pyramids. The contrast between what now is, and what once must have been in Ethiopia and in Egypt, is indeed most striking; nor is it easy to pass, even in thought, through the various scenes of conquest and desolation which must have conspired to produce the effects we contemplate. History sheds no light on events and characters which the lapse of three thousand years has covered with impenetrable obscurity; and whilst groping our way amidst temples dedicated to gods, and structures raised in honour of heroes, whose very names sound like voices from the dead, we content ourselves with the conclusion, which all the monuments impress on us, that, long before the dawn of history, there had existed in that singular region a great people, whose architectural monuments have outlasted their learning, their philosophy, and almost even their very name.

(See Buckhardt's *Travels in Nubia*; Waddington's *Journal of a Visit to some parts of Ethiopia*; Richardson's *Travels in the East*; Henniker's *Notes of a Visit to Egypt and Nubia*; Hoskins' *Travels in Ethiopia*; Belzoni's *Narrative of Operations and Discoveries in Egypt and Nubia*; Gau's *Nubia*; *Life and Adventures of Giovanni Finati*; Russell's *Nubia and Abyssinia*; the work entitled *British Museum*; and Heeren's *Historical Researches*.) (A.)

NUBIAN DESERT, a vast tract of barren rocks and burning sands, extending from Syene in Upper Egypt, to Geon, the capital of Berber in Nubia. As Syene is in latitude 24. 0. 45. north, and Geon in latitude 17. 57. 22., the length of this desert from north to south is 6. 3. 23., or upwards of 420 English miles. Its breadth from east to west has not, as far as we know, been precisely ascertained.

NUCKERGAUT, a town of Northern Hindustan, in the province of Serinagur. Long. 78. 5. E. Lat. 30. 3. N.

NUCLEUS, in general, denotes the kernel of a nut, or any seed enclosed within a husk. The term *nucleus* is also used for the body of a comet, otherwise called its *head*.

NUCTA, a dew, which, falling in Egypt about St John's day, is, by the superstitious natives of the country, considered as miraculous, and the peculiar gift of that saint.

NUDDEA, a town of Bengal, and capital of a district of the same name. It is situated on an island at the confluence of the Jelinghy and Cossimbazar Rivers with the Hooghly, sixty miles north from Calcutta. It was the capital of a Hindu principality anterior to the Mogul conquest of Hindustan, and was taken and entirely destroyed in the year 1204. In modern times it has been the seat of a Brahmin seminary of learning; anterior, however, to that in Benares. Long. 88. 24. E. Lat. 23. 25. N. The district is situated between the twenty-second and twenty-fourth degrees of north latitude. It is of a sandy soil, and is considered as the healthiest and driest part of Bengal, though it is not equally productive with some others. It is computed to contain 764,000 inhabitants, about a third of whom are Mahomedans. The principal towns are Kishenagur, Nuddea, and Santipore.

NUESTRA SENHORA DE LUZ, an island in the Pacific

Nubian
Desert
||
Nuestra
Senhora
de Luz.

Nuldingah Ocean, discovered by Quiros in 1506. It appears to be the same island which was called Pic de l'Etoile by Bougainville. Lat. 14. 30. S.

NUMANTIA, a town of Hindustan, in the province of Bengal, seventy-four miles north-east by north from Calcutta. Long. 89. 7. E. Lat. 23. 25. N.

NUJENGODE, a town of Hindustan, in the province of Mysore, which stands on the south bank of the Cubany River, and is inhabited by Brahmins, who derive their support from a celebrated pagoda or temple, to which immense numbers of Hindus resort. Long. 76. 50. E. Lat. 12. 1. N.

NUMA POMPILIUS, the fourth son of Pompilius Pompo, an illustrious Sabine. Having married Tatia, the daughter of King Tatius, he remained with her in his native country, preferring the tranquillity of a private life to the splendour of a court. Upon the death of his wife, with whom he had lived thirteen years, he gave himself up entirely to the study of wisdom; and, leaving the city of Cures, confined himself to the country, wandering from solitude to solitude, in search only of those woods and fountains which religion had consecrated. His recluse life gave rise to the fable, which was very early received amongst the Sabines, that Numa lived in familiarity with the nymph Egeria. Upon the death of Romulus, both the senate and people strongly solicited him to become their king. They despatched Julius Proculus and Valerius Volesus, two senators of distinction, to acquaint Numa with their resolution, and make him an offer of the kingdom. The Sabine philosopher at first rejected their proposal; but being at last prevailed upon by the arguments and entreaties of the deputies, joined with those of his father, and of Martius his near relation, he at length yielded, and having offered sacrifices to the gods, set out for Rome, where he was received by all ranks of people with loud shouts of joy.

After a reign of forty-two years, during which he had given every possible encouragement to the useful arts, and in which he had cultivated peace, Numa died in the year of Rome 82. Not only the Romans, but also the neighbouring nations, were eager to pay respect to the memory of a monarch whom they revered for his abilities, moderation, and humanity. He forbade his body to be burned, according to the custom of the Romans, and ordered it to be buried near Mount Janiculum, along with many of the books which he had written. These books were accidentally found by one of the Romans, about four hundred years after his death; and as they contained nothing new or interesting, but merely the reasons why he had made innovations in the form of worship and in the religion of the Romans, they were burned by order of the senate.

NUMANTIA, a very noble city, the ornament of the Hither Spain, and celebrated for the long war of twenty years which it maintained against the Romans. The baseness and injustice of the Romans during this war were truly disgraceful to them, and altogether unworthy of a great and powerful people. The inhabitants obtained some advantages over the Roman forces, till Scipio Africanus was empowered to finish the war, and to effect the destruction of Numantia. He began the siege with an army of sixty thousand men, and was bravely opposed by the besieged, who were no more than four thousand men able to bear arms. Both armies behaved with uncommon valour, and the courage of the Numantines was soon changed into the fury of despair. Their provisions began to fail, and they fed upon the flesh of their horses, and afterwards upon that of their dead companions; but at last they were obliged to draw lots to kill and devour one another. The melancholy situation of their affairs obliged them to surrender to the Roman general. Scipio required them to deliver themselves up on the morrow; but they refused, and when a longer time had been granted to their petitions,

they retired, and having set fire to their houses, destroyed themselves, so that not even one remained to adorn the triumph of the conqueror. Some historians, however, deny this, asserting that a number of Numantines delivered themselves into Scipio's hands, and that fifty of them were drawn in triumph at Rome, the rest being sold as slaves. The fall of Numantia was more glorious than that of Carthage or Corinth, though the place was much inferior to either. It was taken by the Romans 629 A. U. C.; and the conqueror obtained the surname of *Numanticus*.

NUMBER, an assemblage of several units, or things of the same kind. Number is either abstract or applicate; abstract, when referred to things in general, without attending to their particular properties; and applicate, when considered as the number of a particular sort of things, as yards, trees, or the like. When particular things are mentioned, there is always something more considered than barely their numbers; so that what is true of numbers in the abstract, or when nothing but the number of things is considered, will not be true when the question is limited to particular things. For instance, the number two is less than three, yet two yards is a greater quantity than three inches; and the reason is, because regard must be had to their different natures as well as number, whenever things of a different species are considered; for although we can compare the number of such things abstractedly, yet we cannot compare them in any applicate sense. And this difference is necessary to be considered, because upon it the true sense, and the possibility or impossibility, of some questions depend. Number is unlimited in respect of increase; because we can never conceive a number so great but there is still a greater. However, in respect of decrease, it is limited; unity being the first and least number, below which, therefore, it cannot descend.

Mathematicians, considering number under a great many relations, have established the following distinctions. Broken numbers are the same with fractions. Cardinal numbers are those which express the quantity of units, as 1, 2, 3, 4, &c.; whereas ordinal numbers are those which express order, as 1st, 2d, 3d, &c. Compound number is one divisible by some other number besides unity; as 12, which is divisible by 2, 3, 4, and 6. Numbers, as 12 and 15, which have some common measure besides unity, are said to be compound numbers amongst themselves. Cubic number is the product of a square number by its root; as 27, which is the product of the square number 9 by its root 3. All cubic numbers, the root of which is less than 6, being divided by 6, the remainder is the root itself. Thus $27 \div 6$ leaves the remainder 3, its root; 216, the cube of 6, being divided by 6, leaves no remainder; 343, the cube of 7, leaves a remainder 1, which, added to 6, is the cube root; and 512, the cube of 8, divided by 6, leaves a remainder 2, which, added to 6, is the cube root. Hence the remainders of the divisions of the cubes above 216, divided by 6, being added to 6, always give the root of the cube so divided till that remainder be 5, and consequently 11, the cube root of the number divided. But the cubic numbers above this being divided by 6, there remains nothing, the cube root being 12. Thus the remainders of the higher cubes are to be added to 12, and not to 6, till you come to 18, when the remainder of the division must be added to 18; and so on *in infinitum*. Determinate number is that referred to some given unit, as a ternary or three; whereas an indeterminate one is that referred to unity in general, and is called *quantity*. Homogeneous numbers are those referred to the same unit; as those referred to different units are termed *heterogeneous*. Whole numbers are otherwise called *integers*. Rational number is one commensurable with unity; as a number incommensurable with unity is termed *irrational*, or a *surd*. In the same manner, a rational whole number is that of

Number.

Number. which unity is an aliquot part; a rational broken number, that equal to some aliquot part of unity; and a rational mixed number, that consisting of a whole number and a broken one. Even number is that which may be divided into two equal parts without any fraction, as 6, 12, &c. The sum, difference, and product, of any number of even numbers, is always an even number. An evenly even number is that which may be measured, or divided, without any remainder, by another even number, as 4 by 2; an unevenly even number, when a number may be equally divided by an uneven number, as 20 by 5; uneven number, that which exceeds an even number, at least by unity, or which cannot be divided into two equal parts, as 3, 5, &c. The sum or difference of two uneven numbers makes an even number; but the factum of two uneven ones makes an uneven number. If an even number be added to an uneven one, or if the one be subtracted from the other, in the former case the sum, in the latter the difference, is an uneven number; but the factum of an even and uneven number is even. The sum of any even number of uneven numbers is an even number; and the sum of any uneven number of uneven numbers is an uneven number.

Primitive or prime numbers are those divisible only by unity, as 5, 7, &c.; and prime numbers amongst themselves are those which have no common measure besides unity, as 12 and 19. Perfect number is that the aliquot parts of which added together make the whole number, as 6, 28; the aliquot parts of 6 being 3, 2, and 1, = 6; and those of 28, being 14, 7, 4, 2, 1, = 28. Imperfect numbers are those the aliquot parts of which added together make either more or less than the whole, and these are distinguished into abundant and defective. An instance in the former case is 12, the aliquot parts of which, 6, 4, 3, 2, 1, make 16; and in the latter case 16, the aliquot parts of which 8, 4, 2, and 1, make but 15. Plane number is that arising from the multiplication of two numbers, as 6, which is the product of 3 by 2; and these numbers are called the *sides of the plane*. Square number is the product of any number multiplied by itself; thus 4, which is the factum of 2 by 2, is a square number. An even square number added to its root makes an even number.

Figurate numbers are such as represent some geometrical figure, in relation to which they are always considered; as triangular, pentagonal, and pyramidal numbers. Figurate numbers are distinguished into orders, according to their place in the scale of their generation, being all produced one from another, viz. by adding continually the terms of any one, the successive sums are the terms of the next order, beginning from the first order, which is that of equal units, 1, 1, 1, 1, &c.; then the second order consists of the successive sums of those of the first order, forming the arithmetical progression 1, 2, 3, 4, &c.; those of the third order are the successive sums of those of the second, and are the triangular numbers 1, 3, 6, 10, 15, &c.; those of the fourth order are the successive sums of those of the third, and are the pyramidal numbers 1, 4, 10, 20, 35, &c.; and so on, as below:

Order.	Names.	Numbers.
1.	Equals,	1, 1, 1, 1, 1, &c.
2.	Arithmeticals,	1, 2, 3, 4, 5, &c.
3.	Triangulars,	1, 3, 6, 10, 15, &c.
4.	Pyramidals,	1, 4, 10, 20, 35, &c.
5.	Second Pyramidals,	1, 5, 15, 35, 70, &c.
6.	Third Pyramidals,	1, 6, 21, 56, 126, &c.
7.	Fourth Pyramidals,	1, 7, 28, 84, 210, &c.

The above are all considered as different sorts of trian-

gular numbers, being formed from an arithmetical progression the common difference of which is 1. But if that common difference be 2, the successive sums will be the series of square numbers; if it be 3, the series will be pentagonal numbers, or pentagons; if it be 4, the series will be hexagonal numbers, or hexagons; and so on. Thus:

Arithmeticals.	First Sums, or Polygons.	Second Sums, or Second Polygons.
1, 2, 3, 4	Tri. 1, 3, 6, 10	1, 4, 10, 20
1, 3, 5, 7	Sqrs. 1, 4, 9, 16	1, 5, 14, 30
1, 4, 7, 10	Pent. 1, 5, 12, 22	1, 6, 18, 40
1, 5, 9, 13	Hex. 1, 6, 15, 28	1, 7, 22, 50
&c.		

The reason of the names, triangles, squares, pentagons, hexagons, and the like, is, that those numbers may be placed in the form of these regular figures or polygons. But the figurate numbers of any order may also be found without computing those of the preceding orders; which is done by taking the successive products of as many of the terms of the arithmeticals, 1, 2, 3, 4, 5, &c. in their natural order, as there are units in the number which denominates the order of figurates required, and dividing these products always by the first product. Thus the triangular numbers are found by dividing the products 1×2 , 2×3 , 3×4 , 4×5 , &c. each by the first product 1×2 ; the first pyramids by dividing the products $1 \times 2 \times 3$, $2 \times 3 \times 4$, $3 \times 4 \times 5$, &c. by the first $1 \times 2 \times 3$. And, in general, the figurate numbers of any order n , are found by substituting successively 1, 2, 3, 4, 5, &c. instead of x in this general expression $\frac{x \cdot x + 1 \cdot x + 2 \cdot x + 3 \cdot \&c.}{1 \cdot 2 \cdot 3 \cdot 4 \cdot \&c.}$;

where the factors in the numerator and denominator are supposed to be multiplied together, and to be continued till the number in each be less by 1 than that which expresses the order of the figurates required.¹

Polygonal or polygonous numbers are the sums of arithmetical progressions beginning with unity, and these, where the common difference is 1, are called *triangular numbers*; where it is 2, *square numbers*; where it is 3, *pentagonal numbers*; where it is 4, *hexagonal numbers*; where it is 5, *heptagonal numbers*, &c. Pyramidal numbers, the sums of polygonous numbers, collected after the same manner as the polygons themselves, and not gathered out of arithmetical progressions, are called *first pyramidal numbers*; and the sums of the first pyramids are called *second pyramids*, &c. If they arise out of triangular numbers, they are called *triangular pyramidal numbers*; and if out of pentagons, *first pentagonal pyramids*. From the manner of summing up polygonal numbers, it is easy to conceive how the prime pyramidal numbers are found. The formula $\frac{(a-2)n^3 + 3n^3 - (a-5)n}{6}$ expresses all the prime pyramids.

The number 9 has a very curious property, its products always composing either 9 or some lesser product thereof. If our limits permitted us, we could instance in a variety of other numbers properties both curious and surprising. Such speculations are indeed by some men considered as trifling and useless. But perhaps they judge too hastily; for few employments are more innocent, none more ingenious, nor, to those who have a taste for them, more amusing. Numbers were by the Jews, as well as the ancient Greeks

¹ See Maclaurin's Fluxions, art. 351, in the notes; also Simpson's Algebra, p. 213; or Malcolm's Arithmetic, p. 396, where the subject of figurates is treated in a very extensive and perspicuous manner. Hutton's Mathematical Dictionary may also be consulted.

Numbers
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Numeral
Letters.

and Romans, expressed by means of letters of the alphabet. Hence we may conceive how imperfect and limited their arithmetic was; because the letters could not be arranged in a series, or in different lines, conveniently enough for the purposes of ready calculation. The invention of the ciphers, or arithmetical figures, which we now make use of, has given us in this respect a very great advantage over the ancients; to say nothing of that which is derived from these figures having a value in position. See ARITHMETIC.

The letters chiefly employed by the Romans to express numbers were, M for 1000, D for 500, C for 100, L for 50, V for 5, X for 10, and I for one. M probably signifies 1000, because it is the initial of *mille*; D stands for 500, because it is *dimidium mille*; C signifies 100, as being the first letter of the word *centum*; L stands for 50, because it is the half of C, having formerly been written thus, L; V signifies 5, because V is the half of X, which stands for 10; I stands for one, because it is the first letter of *initium*. These, however, are fanciful derivations, and an explanation more accordant with philosophical principles has been given in the article ARITHMETIC. See also NUMERAL LETTERS.

The Jewish cabbalists, the Grecian conjurors, and the Roman augurs, had a great veneration for particular numbers, and the result of particular combinations of numbers. Thus three, four, six, seven, nine, ten, were full of divine mysteries, and of great efficacy.

NUMBERS, in *Poetry* and *Oratory*, are certain measures, proportions, or cadences, which render a verse, period, or song agreeable to the ear.

Poetical numbers consist in a certain harmony in the order, quantities, and adjustment of the feet and syllables which render the piece musical to the ear, and capable of being sung, for which all the verses of the ancients were intended. It is of these numbers Virgil speaks in his ninth Eclogue, when he makes Lycidas say, *Numeros memini, si verba tenerem*; meaning, that although he had forgotten the words of the verses, yet he remembered the feet and measure of which they were composed.

Rhetorical or prosaic numbers are a sort of simple unaffected harmony, less glaring than that of verse, but such as is perceived and affects the mind with pleasure.

Book of NUMBERS, the fourth book of the Pentateuch, taking its denomination from the numbering of the families of Israel. A part of this book is historical, relating to several remarkable passages in the march of the Israelites through the wilderness. It contains a distinct relation of their several movements from one place to another, or their forty-two stages through the wilderness, and many other things, by which we are instructed and confirmed in some of the most weighty truths which have immediate reference to God and his providence in the world. But the greater part of this book is occupied in enumerating those laws and ordinances, whether civil or ceremonial, which were given by God, but not mentioned before in the preceding books.

NUMERAL LETTERS are those letters of the alphabet which are generally used for figures, as I, one; V, five; X, ten; L, fifty; C, a hundred; D, five hundred; M, a thousand; and so on. It is not agreed how the Roman numerals originally received their value. It has been supposed, as we have observed in the article NUMBER, that the Romans used M to denote 1000, because it is the first letter of *mille*, which is the Latin word for 1000; and C to denote 100, because it is the first letter of *centum*, which in Latin means 100. It has also been supposed that D, being formed by dividing the old M in the middle, was therefore appointed to stand for 500, that is, half as much as the M stood for when it was whole; and that L being half a C, originally written C, was for the same reason used to denominate fifty. But what reason is there to suppose that

1000 and 100 were the numbers which letters were first used to express? And what reason can be assigned why D, the first letter in the Latin word *decem*, ten, should not rather have been chosen to stand for that number than for 500, because it had a rude resemblance to half an M? But if these questions could be satisfactorily answered, there are other numeral letters which have never yet been accounted for at all. These considerations render it probable that the Romans did not, in their original intention, employ letters to express numbers at all. The most natural account of the matter seems to be this: The Romans probably put down a single stroke, I, for one, as is still the practice of those who score upon a slate or with chalk. This stroke, I, they doubled, trebled, and quadrupled, to express 2, 3, and 4; thus, II., III., IIII. So far they could easily number the strokes with a glance of the eye. But they presently found that if more were added it would soon be necessary to tell the strokes one by one. For this reason, then, when they came to 5, they expressed it by joining two strokes together in an acute angle, thus, V; which will appear the more probable, if it be considered that the progression of the Roman numbers is from 5 to 5, that is, from the fingers on one hand to the fingers on the other. Ovid has touched upon the original of this in his *Fasti* (lib. iii.), and Vitruvius has made a similar remark.

After they had made this acute angle V for five, they added the single strokes to it to the number of four, thus VI., VII., VIII., VIII., and then, as the strokes could not be further multiplied without confusion, they doubled their acute angle by prolonging the two lines beyond their intersection, thus, X, to denote two fives, or ten. After this they doubled, trebled, and quadrupled this double acute angle thus, XX., XXX., XXXX.; they then, for the same reason which induced them first to make a single and then to double it, joined two single strokes in another form, and instead of an acute angle, made a right angle, L, to denote fifty. When this fifty was doubled, they then doubled the right angle thus, E, to denote 100; and having numbered this double right angle four times, thus, CC, CCC, CCCC, when they came to the fifth number, as before, they reverted it, and put a single stroke before it thus IC, to denote 500; and when this 500 was doubled, then they also doubled their double right angle, setting two double right angles opposite to each other, with a single stroke between them, thus, ICIC, to denote 1000. When this note for 1000 had been four times repeated, then they put down ICICICIC for 5000, ICICICICIC for 10,000, and ICICICICICIC for 50,000, and ICICICICICICICICICIC for 100,000, ICICICICICICICICICICICICICICIC for 500,000, and IC for one million.

That the Romans did not originally write M for 1000, and C for 100, but square characters, as they are represented above, we are expressly informed by Paulus Manutius; but the corners of the angles being cut off by the transcribers for despatch, these figures were gradually brought into what are now numeral letters. When the corners of ICIC were made round, it stood thus CIC, which is so near the Gothic *m*, that it soon deviated into that letter; so IC having the corners rounded, stood thus, IC, and then easily deviated into D. L also became a plain C by the same means; the single rectangle which denoted fifty was, without alteration, a capital L; the double acute angle was an X; the single acute angle a V consonant; and a plain single stroke the letter I; and thus these seven letters, M, D, C, L, X, V, I, became numerals.

NUMERAL Characters of the Arabs are those figures which are now used in all the operations of arithmetic in every nation in Europe. See the article ARITHMETIC.

NUMERATION, or NOTATION, in *Arithmetic*, the art of expressing in characters any number proposed in words, or of expressing in words any number proposed in characters. See ARITHMETIC.

Numera-
tion.

Numerical
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Numidia.

NUMERICAL, NUMEROUS, or *Numeral*, something relating to numbers; thus Numerical Algebra is that which makes use of numbers instead of letters of the alphabet. Numerical difference is also that by which one man is distinguished from another. Hence a thing is said to be numerically the same, when it is so in the strictest sense of the word.

NUMIDIA, an ancient kingdom of Africa, bounded on the north by the Mediterranean Sea; on the south by Gætulia, or part of Libya Interior; on the west by the Mulucha, a river which separated it from Mauritania; and on the east by the Tusca, another river which formed its continuous boundary with Africa Propria.

This country included two divisions, one inhabited by the *Massyli*, and the other by the *Massæsyli*; the country of the latter being also called in after times *Mauritania Cæsariensis*, and that of the former *Numidia Propria*. The country of the Massyli, or, as some call it, *Terra Metagonitis*, was separated from the territory of Carthage by its eastern boundary the river Tusca, and from the kingdom of the Massæsyli, or Mauritania Cæsariensis, by the river Ampsaga; and it seems to have corresponded with that part of the province of Constantina lying between the Zaine and the Wed al Kebeer, which is above 130 miles in length, and more than 100 in breadth. The sea-coast of this province is for the most part mountainous and rocky, answering to the appellation given to it by Abulfeda, who calls it *El Edwaa*, the high or lofty. It is far from being equal in extent to the ancient country of the Massæsyli, which, however, Strabo informs us, was inferior to the country of the Massyli. Its capital was Cirta, a place of very considerable note amongst the ancients.

Several learned writers have supposed that the tract extending from the isthmus of Suez to the lake Tritonis was chiefly peopled by the descendants of Mizraim, and that the posterity of his brother Put, or Phut, spread themselves all over the country between that lake and the Atlantic Ocean. And to this notion Herodotus gives some countenance; for he tells us that the Libyan Nomades, whose territories to the west were bounded by the Triton, agreed in their customs and manners with the Egyptians; but that the Africans, from that river to the Atlantic Ocean, differed from them in almost all points. Ptolemy mentions a city called *Putea*, near Adrametum, and Pliny a river of Mauritania Tingitana, known by the name of *Fut*, or *Phut*; and the district adjacent to this river was called *Regio Phutensis*, which plainly involves in it the name of *Phut*. That word signifies scattered or dispersed; and this agrees very well with what Mela and Strabo relate of the ancient Numidians; so that we may, without any scruple, admit the aborigines of this country to have been the descendants of Phut.

The history of Numidia, during many of the early ages, is buried in oblivion. It is probable, however, that as the Phœnicians were masters of a great part of the country, their transactions had been recorded, and were generally known to the Carthaginians. King Jarbas probably reigned here as well as in Africa Propria, if not in Mauritania and other parts of Libya, when Dido began to build Byrsa. It appears from Justin, that about the age of Herodotus the people of this country were called both Africans or Libyans, and Numidians. Justin likewise intimates, that about this time the Carthaginians vanquished both the Moors or Mauritians and the Numidians; in consequence of which they were excused from paying the tribute which had hitherto been demanded of them.

After the conclusion of the first Punic war, the African troops carried on a sanguinary contest against their masters the Carthaginians; and the most active in this rebellion, according to Diodorus Siculus, were a part of the Numidian nation named Micatanians. This so incensed

the Carthaginians, that after Hamilcar had either killed or taken prisoners all the mercenaries, he sent a large detachment to ravage the country of those Numidians; and the commandant of that detachment executed his orders with the utmost cruelty, plundering the district in a terrible manner, and crucifying, without distinction, all the prisoners who fell into his hands. This filled the rest with such indignation and resentment, that both they and their posterity ever afterwards cherished an implacable hatred to the Carthaginians.

In the time of the second Punic war, Syphax, king of the Massæsyli, having entered into an alliance with the Romans, gave the Carthaginians a considerable defeat. This induced Gala, king of the Massyli, to conclude a treaty with the Carthaginians, in consequence of which his son Masinissa marched at the head of a powerful army to give Syphax battle. The contest ended in favour of Masinissa; thirty thousand of the Massæsyli were put to the sword, and Syphax driven into Mauritania; and a similar reverse attended Syphax in another engagement, where his troops were entirely defeated and dispersed.

Gala having died whilst his son Masinissa was acting at the head of the Numidian troops sent to the assistance of the Carthaginians in Spain, his brother Desalces, according to the established rules of succession in Numidia, took possession of the Massylian throne. That prince, however, died soon after his succession, and Capusa his eldest son succeeded him. But he did not long enjoy his high dignity; for one Mezetulus, a person of the royal blood, but an enemy to the family of Gala, found means to excite a great part of his subjects to revolt. A battle soon took place between him and Capusa, in which the latter was slain with many of the nobility, and his army entirely defeated. But though Mezetulus thus became possessed of the sovereignty, he did not think proper to assume the title of king, and only styled himself guardian to Lacumaces, the surviving son of Desalces, whom he graced with the royal title. To support himself in his usurpation, he married the widow of Desalces, who was Hannibal's niece, and consequently of the most powerful family in Carthage; and in order to attain the same end, he sent ambassadors to Syphax, to conclude a treaty of alliance with him. In the mean time, Masinissa, having received advice of his uncle's death, of his cousin's slaughter, and of Mezetulus's usurpation, immediately passed over to Africa, and went to the court of Bocchar king of Mauritania to solicit succours. Bocchar, sensible of the great injustice which had been done Masinissa, gave him a body of four thousand Moors to escort him to his dominions; and his subjects, being apprised of his approach, joined him upon the frontiers with a party of five hundred men. The Moors, in pursuance of their orders, returned home as soon as Masinissa reached the confines of his kingdom; notwithstanding which, and the small body that declared for him, having accidentally met Lacumaces at Thapsus, with an escort, going to implore the assistance of Syphax, he drove him into the town, which he carried by assault after a faint resistance. Lacumaces, however, with many of his men, found means to escape to Syphax. The fame of this exploit gained Masinissa great credit, insomuch that the Numidians flocked to him from all parts, and amongst the rest many of his father Gala's veterans, who pressed him to make a speedy and vigorous effort to recover his hereditary dominions. Lacumaces having joined Mezetulus with a reinforcement of Massæsylians, which he had prevailed upon Syphax to send to the assistance of his ally, the usurper advanced at the head of a numerous army to offer Masinissa battle, which that prince, although much inferior in numbers, did not decline. An engagement accordingly ensued, and, notwithstanding the inequality of numbers, it ended in the defeat of Lacumaces. The im-

Numidia.

Numidia. mediate consequence of this victory of Masinissa was the quiet and peaceable possession of his kingdom; Mezetulus and Lacumaces, with a few that attended them, having fled into the territories of Carthage. However, being apprehensive that he should be obliged to sustain a war against Syphax, he offered to treat Lacumaces with as many marks of distinction as his father Gala had Desalces, provided that prince would put himself under his protection. He also promised Mezetulus pardon, and the restitution of all the property forfeited by his treasonable conduct, if he would make his submission to him. Both of them readily complied with the proposal, and immediately returned home; so that the tranquillity and repose of Numidia would have been settled upon a solid and lasting foundation, had not this been prevented by Asdrubal, who was then at the court of Syphax. He insinuated to that prince, who was disposed to live amicably with his neighbours, "that he was greatly mistaken if he imagined Masinissa would be satisfied with his hereditary dominions; that he was a prince of much greater capacity and ambition than either his father Gala, his uncle Desalces, or any of his family; that he had discovered in Spain marks of rare and uncommon merit; and that, in fine, unless this rising flame was extinguished before it came to too great a head, both the Massæsylian and Carthaginian states would infallibly be consumed by it." Syphax, alarmed by these suggestions, advanced with a numerous body of forces into a district which had long been a subject of dispute between him and Gala, but was then in possession of Masinissa. This brought on a general action between these two princes, wherein the latter was totally defeated, his army dispersed, and he himself obliged to fly to the top of Mount Balbus, attended by only a few of his horse. Such a decisive battle, before Masinissa had been firmly seated on his throne, could not fail to put Syphax into possession of the kingdom of the Massyli. Masinissa, in the mean time, made nocturnal incursions from his post upon Mount Balbus, and plundered all the adjacent country, particularly that part of the Carthaginian territory contiguous to Numidia. This district he not only thoroughly pillaged, but likewise laid waste with fire and sword, carrying off from thence an immense booty, which was purchased of him by some merchants, who had put into one of the Carthaginian ports for that purpose. In fine, he did the Carthaginians more damage, not only by committing such dreadful devastations, but by massacring and carrying into captivity vast numbers of their subjects on this occasion, than they could have sustained in a pitched battle, or a whole campaign of a regular war. Syphax, at the pressing and reiterated instances of the Carthaginians, sent Bocchar, one of his most active commanders, with a detachment of four thousand foot and two thousand horse, to reduce this pestilent gang of robbers; promising him a great reward if he would bring Masinissa either alive or dead. Bocchar, having watched an opportunity, surprised the Massylians as they were straggling about the country without any order or discipline; so that he took many prisoners, dispersed the rest, and pursued Masinissa himself, with a few of his men, to the top of the mountain where he had before taken post. Considering the expedition as ended, he not only sent many head of cattle, and the other booty that had fallen into his hands, to Syphax, but likewise all the force, except five hundred foot and two hundred horse. With this detachment he drove Masinissa from the summit of the hill, and pursued him through several narrow passes and defiles as far as the plains of Clupea, where he so completely surrounded him, that all the Massylians except four were put to the sword, and Masinissa himself, after having received a dangerous wound, escaped with the utmost difficulty. As this was effected by crossing a rapid river, in which attempt two of his four attendants perished

in the sight of the detachment that pursued him, it was rumoured all over Africa that Masinissa also was drowned; news which gave inexpressible pleasure to Syphax and the Carthaginians. For some time he lived undiscovered in a cave, where he was supported by the robberies of the two horsemen who had made their escape with him. But having cured his wound by the application of some medicinal herbs, he began to advance boldly towards his own frontiers, giving out publicly that he intended once more to take possession of his kingdom. In his march he was joined by about forty horse, and, soon after his arrival amongst the Massyli, so many people flocked to him from all parts, that out of them he formed an army of six thousand foot and four thousand horse. At the head of these forces he not only reinstated himself in possession of his dominions, but likewise laid waste the borders of the Massæsyli. This so irritated Syphax, that he immediately assembled a numerous body of troops, and encamped very commodiously upon a ridge of mountains between Cirta and Hippo. His army he commanded in person, and detached his son Vermina, with a considerable force, to make a detour, and attack the enemy in the rear. In pursuance of his orders, Vermina set out in the beginning of the night, and took post in the place appointed, without having been discovered by the enemy. In the mean time Syphax decamped, and advanced towards the Massyli, in order to give them battle. When he had possessed himself of a rising ground which led to their camp, and concluded that his son Vermina must have formed the ambuscade behind them, he began the fight. Masinissa being advantageously posted, and his soldiers distinguishing themselves in an extraordinary manner, the dispute proved long and bloody. But Vermina having unexpectedly fallen upon their rear, and by this means obliged them to divide their forces, which were scarcely able before to oppose the main body under Syphax, they were soon thrown into confusion, and forced to betake themselves to a precipitate flight. All the avenues being blocked up, partly by Syphax, and partly by his son, such a dreadful slaughter was made of the unhappy Massylians, that only Masinissa himself, and sixty horse, escaped to the Lesser Syrtis. Here he remained, between the confines of the Carthaginians and the Garamantes, till the arrival of Lælius and the Roman fleet on the coast of Africa.

By the assistance of Lælius, Masinissa at last reduced Syphax's kingdom. According to Zonaras, Masinissa and Scipio, before the memorable battle of Zama, deprived Hannibal, by a stratagem, of some advantageous posts; which, with a solar eclipse that happened during the heat of the action, and not a little intimidated the Carthaginian troops, greatly contributed to the victory obtained by the Romans. At the conclusion, therefore, of the second Punic war, he was amply rewarded by the Romans for the important services he had rendered them. As for Syphax, after the loss of his dominions, he was kept in confinement for some time at Alba; but being removed thence in order to grace Scipio's triumph, he died at Tibur, in his way to Rome. Zonaras adds, that his corpse was decently interred; that all the Numidian prisoners were released; and that Vermina, by the assistance of the Romans, took peaceable possession of his father's throne. However, part of the Massæsylian kingdom had before been annexed to Masinissa's dominions, in order to reward that prince for his singular fidelity and firm attachment to the Romans.

Nothing further is requisite to complete the history of this famous prince, than to exhibit some points of his conduct towards the decline and at the close of life; the wise dispositions made after his death by Æmilianus for the regulation of his domestic affairs; and some particulars relating to his character, genius, and habit of body, drawn from the most celebrated Greek and Roman authors.

By drawing a line of circumvallation around the Cartha-

Numidia. Carthaginian army under Asdrubal, posted upon an eminence, Masinissa cut off all manner of supplies, and thus introduced both the plague and famine into their camp. As the body of Numidian troops employed in this blockade was not nearly so numerous as the Carthaginian forces, it is evident, that the line here mentioned must have been extremely strong, and consequently the effect of great labour and art. The Carthaginians, finding themselves reduced to the last extremity, concluded a peace upon the terms which Masinissa himself dictated to them, viz. That they should deliver up all deserters; that they should recall their exiles, who had taken refuge in his dominions; that they should pay him five thousand talents of silver within the space of fifty years; and that their soldiers should pass under the yoke, each of them carrying off only a single garment. As Masinissa himself, though between eighty and ninety years of age, conducted the whole enterprise, he must have been extremely well versed in fortification, and other branches of the military art; and he must likewise have retained his understanding to the last. This happened a short time before the commencement of the third Punic war.

Soon afterwards, the consuls landed an army in Africa, in order to lay siege to Carthage, without imparting their design to Masinissa. This not a little chagrined him, as it was contrary to the former practice of the Romans, who, in the preceding war, had communicated their intentions to him, and consulted him on all occasions. When, therefore, the consuls applied to him for a body of his troops to act in concert with their forces, he answered, "That they should have a reinforcement from him when they stood in need of it." The reflection, that after he had extremely weakened the Carthaginians, and even brought them to the brink of ruin, his pretended friends should come to reap the fruits of his victory, without giving him the least intelligence of their design, must have been sufficiently galling to an old and faithful ally, who had done and suffered so much in their cause.

However, his mind soon returned to its natural bias, which was in favour of the Romans. Finding his end approaching, he sent to Æmilianus, then a tribune in the Roman army, to desire a visit from him. What he proposed by this visit, was to invest him with full powers to dispose of his kingdom and estate as he should think proper, for the benefit of his children. The high idea he had entertained of that young hero's abilities and integrity, together with his gratitude and affection for the family into which he was adopted, induced him to take this step. But believing that death would not permit him to have a personal conference with Æmilianus upon this subject, he informed his wife and children, in his last moments, that he had empowered him to dispose, in an absolute manner, of all his possessions, and divide his kingdom amongst his sons; to which he subjoined, "I require, that whatever Æmilianus may decree, shall be executed as punctually as if I myself had appointed it by my will." Having uttered these words, he expired, at a very advanced age.

Masinissa, before his death, gave his ring to his eldest son Micipsa, but left the distribution of all his other effects and possessions amongst his children entirely to Æmilianus. Of fifty-four sons who survived him, only three were legitimate, to wit, Micipsa, Gulussa, and Mastanabal. Æmilianus arrived at Cirta after he had expired, and divided his kingdom, or rather the government of it, amongst these three, though to the others he gave considerable possessions. To Micipsa, who was a prince of a pacific disposition, and the eldest son, he assigned Cirta, the metropolis, for the place of his residence, in exclusion of the others. Gulussa, the next to him, being a prince of military genius, had the command of the army, and the transacting of all affairs relating to peace or war, committed to his care. And

Numidia. Mastanabal, the youngest, had allotted him the administration of justice, an employment suitable to his education. They enjoyed in common the immense treasures Masinissa had amassed, and were all of them dignified by Æmilianus with the royal title. After he had made these various dispositions, he departed from Cirta, taking with him a body of Numidian troops, under the conduct of Gulussa, to reinforce the Roman army which was then acting against the Carthaginians.

Mastanabal and Gulussa died soon after their father, as appears from the express testimony of Sallust; and we find nothing remarkable of these princes, besides what has been already related, except that the latter continued to assist the Romans in the third Punic war, and that the former was pretty well versed in the Greek language. Micipsa, therefore, became sole possessor of the kingdom of Numidia. In his reign, and under the consulate of M. Plautius Hypsæus and M. Fulvius Flaccus, according to Orosius, a great part of Africa was covered with locusts, which destroyed all the produce of the earth, and even devoured dry wood. But at last they were all carried by the wind into the African Sea, out of which being thrown in vast heaps upon the shore, a plague ensued, which swept away an infinite number of animals of all kinds. In Numidia alone eight hundred thousand men perished, and in Africa Propria two hundred thousand, including thirty thousand Roman soldiers quartered in and about Utica for the defence of the province. At Utica, in particular, the mortality raged to such a degree, that fifteen hundred dead bodies were carried out at one gate in a day. Micipsa had two sons, Adherbal and Hiempsal, whom he educated in his palace, together with his nephew Jugurtha. That young prince was the son of Mastanabal; but his mother having been only a concubine, Masinissa had taken no great notice of him. However, Micipsa considering him as a prince of the blood, took as much care of him as he did of his own children.

Jugurtha possessed several eminent qualities, which gained him universal esteem. He was very handsome, endowed with great strength of body, and adorned with the finest intellectual endowments. He did not devote himself, as young men commonly do, to a life of luxury and pleasure. He used to exercise himself, with persons of his own age, in running, riding, hurling the javelin, and other manly exercises, suited to the martial genius of the Numidians; and although he surpassed all his fellow sportsmen, there was not one of them but loved him. The chase was his only delight; but it was that of lions and other savage beasts. Sallust, to finish the picture of his character, tells us, that he excelled in all things, and spoke very little of himself.

So conspicuous an assemblage of fine talents and perfections at first charmed Micipsa, who thought them an ornament to his kingdom. However, he soon began to reflect that he was considerably advanced in years, and his children in their infancy; that mankind naturally thirsted after power, and that nothing was capable of making men run greater lengths than a vicious and unlimited ambition. These reflections soon excited his jealousy, and determined him to expose Jugurtha to a variety of dangers, some of which, he hoped, might prove fatal to the aspiring youth. With this view he gave Jugurtha the command of a body of forces which he sent to assist the Romans, who were at that time besieging Numantia in Spain. But Jugurtha, by his admirable conduct, not only escaped all those dangers, but likewise won the esteem of the whole army, and the friendship of Scipio, who sent a high character of him to his uncle Micipsa. However, that general gave him some prudent advice in relation to his future conduct; observing in him, no doubt, certain sparks of ambition, which, if lighted into a flame, he apprehended might one day be productive of the most fatal consequences.

Numidia.

Before this last expedition, Micipsa had endeavoured to find out some method of taking him off privately; but the popularity of Jugurtha amongst the Numidians obliged that prince to lay aside all thoughts of this kind. After his return from Spain the whole nation almost adored him. The heroic bravery he had shown there; his undaunted courage, joined to the utmost calmness of mind, which enabled him to preserve a just medium between a timorous foresight and an impetuous rashness, a circumstance rarely to be met with in persons of his age; and, above all, the advantageous testimonials of his conduct given by Scipio, attracted universal esteem. Nay, Micipsa himself, charmed with the high opinion which the Roman general had entertained of his merit, changed his behaviour towards him; resolving, if possible, to win his affection by kindness. He therefore adopted him, and declared him joint heir with his two sons to the crown. Some few years afterwards, finding that his end approached, he sent for all the three to his bed side, where, in the presence of the whole court, he desired Jugurtha to recollect with what extreme tenderness he had treated him, and consequently to consider how well he had deserved at his hands. He then entreated him to protect on all occasions his children, who, being before related to him by the ties of blood, were now by their father's bounty become his brethren. In order to fix him the more firmly in their interest, he likewise complimented him upon his bravery, address, and consummate prudence. He further insinuated, that neither arms nor treasures constitute the strength of a kingdom; but friends, who are neither won by arms nor gold, but by real services and an inviolable fidelity. "Now," continued he, "where can we find better friends than in brothers? And how can that man who becomes an enemy to his relations repose any confidence in or place dependence on strangers?" Then addressing himself to Adherbal and Hiempsal, "And you," said he, "I enjoin to pay always the highest reverence to Jugurtha. Endeavour to imitate, and if possible surpass, his exalted merit, that the world may not hereafter observe Micipsa's adopted son to have reflected greater glory upon his memory than his own children." Soon afterwards, Micipsa, who, according to Diodorus, was a prince of an amiable character, expired. Though Jugurtha did not believe that the king spoke his real sentiments in regard to him, yet he seemed extremely pleased with so gracious a speech, and made him an answer suitable to the occasion. However, that prince at the same time determined within himself to put in execution the scheme he had formed at the siege of Numantia, and which had been suggested to him by some factious and abandoned Roman officers, with whom he there contracted an acquaintance. The purport of this scheme was, that he should extort the crown by force from his two cousins, as soon as their father's eyes were closed; which, they insinuated, might easily be effected by means of his own valour, and the venality of the Romans. Accordingly, a short time after the old king's death, he found means to assassinate Hiempsal in the city of Thirmida, where his treasures were deposited, and to drive Adherbal out of his dominions. That unhappy prince found himself obliged to fly to Rome, where he endeavoured to engage the conscript fathers to espouse his quarrel; but, notwithstanding the evident justice of his cause, they had not virtue enough effectually to support him. Jugurtha's ambassadors, by distributing vast sums of money amongst the senators, brought them so far over that a majority palliated his inhuman proceedings. This encouraged the usurper's ministers to declare that Hiempsal had been killed by the Numidians on account of his excessive cruelty; that Adherbal was the aggressor in the late troubles; and that he was only chagrined because he could not make that havock amongst his countrymen which he would willingly have done. They therefore entreated the

senate to form a judgment of Jugurtha's behaviour in Africa from his conduct at Numantia, rather than from the suggestions of his enemies; upon which, by far the greater part of the senate discovered that they were prejudiced in his favour. A few, however, who were not lost to honour nor abandoned to corruption, insisted upon bringing him to condign punishment. But as they could not prevail, Jugurtha had the best part of Numidia allotted him, and Adherbal was forced to rest satisfied with the other.

Jugurtha, finding now by experience that every thing was venal at Rome, as his friends at Numantia had before informed him, thought he might pursue his towering projects without meeting any obstruction from that quarter. He, therefore, immediately after the final division of Micipsa's dominions, threw off the mask, and attacked his cousin by open force. As Adherbal was a prince of a pacific disposition, and almost in all respects the reverse of Jugurtha, he was by no means a match for him. The latter therefore pillaged the territories of the former, stormed several of his fortresses, and overran a good part of his kingdom, without opposition. Adherbal, depending upon the friendship of the Romans, which his father in his last moments had assured him would be a stronger support to him than all the troops and treasures in the universe, despatched deputies to Rome to complain of these hostilities. But whilst he lost valuable time in sending thither fruitless deputations, Jugurtha overthrew him in a pitched battle, and soon afterwards shut him up in Cirta. During the siege of this city, a Roman commission arrived there, in order to persuade both parties to come to an accommodation; but finding Jugurtha untractable, the commissioners returned home without so much as conferring with Adherbal. A second deputation, composed of senators of the highest distinction, with Æmilius Scaurus, president of the senate, at their head, landed some time afterwards at Utica, and summoned Jugurtha to appear before them. That prince at first seemed to be under dreadful apprehensions, especially as Scaurus reproached him with his enormous crimes, and threatened him with the resentment of the Romans if he did not immediately raise the siege of Cirta. However, the Numidian, by his address, and the irresistible power of gold, as was afterwards suspected at Rome, so mollified Scaurus that he left Adherbal at his mercy. In fine, Jugurtha had Cirta at last surrendered to him, upon the condition only that he should spare the life of Adherbal. But the merciless tyrant, in violation of the laws of nature and humanity as well as the capitulation, when he had got possession of the town, ordered him to be put to a most cruel death. The merchants, likewise, and all the Numidians in the place capable of bearing arms, he caused to be put to the sword without distinction.

Every person at Rome inspired with any sentiment of humanity was stricken with horror at the news of this tragical event. However, all the venal senators still concurred with Jugurtha's ministers in palliating his enormous crimes; notwithstanding which, the people, excited thereto by Caius Memmius their tribune, who bitterly inveighed against the venality of the senate, resolved not to let so flagrant an instance of villany go unpunished. This disposition in them induced the conscript fathers likewise to declare their intention to chastise Jugurtha. For this purpose, an army was levied to invade Numidia, and the command of it given to the consul Calpurnius Bestia, a person of good abilities, but rendered unfit for the expedition he was to be employed on by his insatiable avarice. Jugurtha being informed of the great preparations making at Rome to attack his dominions, sent his son thither in hopes of averting the impending storm. The young prince was plentifully supplied with money, which he had orders to distribute liberally amongst the leading men. But Bestia, proposing to himself great advantages from an invasion of Nu-

Numidia.

Numidia. midia, defeated all his intrigues, and got a decree passed, ordering him and his attendants to leave Italy in ten days, unless they were come to deliver up the king himself, and all his territories, to the republic, by way of surrender; which decree being notified to them, they returned without so much as having entered the gates of Rome, and the consul soon afterwards landed with a powerful army in Africa. For some time he carried on the war there very briskly, and having reduced several strongholds, took many Numidians prisoners. But upon the arrival of Scaurus, a peace was granted to Jugurtha upon advantageous terms. That prince having come from Vacca, the place of his residence, to the Roman camp, in order to confer with Bestia and Scaurus, the preliminaries of the treaty were immediately after settled between them in private conferences; and every body at Rome was convinced that the prince of the senate and the consul had sacrificed the republic to their avarice. The indignation of the people, therefore, displayed itself in the strongest manner. Memmius also fired them with his speeches; and it was consequently resolved to despatch the prætor Cassius, a person they could confide in, to Numidia, to prevail upon Jugurtha to come to Rome, that they might learn from the king himself which of their generals and senators had been seduced by the pestilent influence of corruption. Upon his arrival there, Jugurtha found means to bribe one Bæbius Salca, a man of great authority amongst the plebeians, but of insatiable avarice, by whose assistance he escaped with impunity. Nay, by the efficacy of gold, he not only eluded all the endeavours of the people of Rome to bring him to justice, but likewise enabled Bomilcar, one of his attendants, to get Massiva, an illegitimate son of Micipsa, assassinated in the streets of Rome. That young prince was advised by many Romans of probity, wellwishers to the family of Masinissa, to apply for the kingdom of Numidia; which having come to the ears of Jugurtha, he prevented the application by this execrable step. However, he was obliged to leave Italy immediately.

Jugurtha had scarcely set foot in Africa, when he received advice that the senate had annulled the shameful peace concluded with him by Bestia and Scaurus. Soon afterwards, the consul Albinus transported a Roman army into Numidia, flattering himself with the hopes of reducing Jugurtha to reason before the expiration of his consulate. In this, however, he found himself deceived; for that crafty prince, by various artifices, so amused and imposed upon Albinus, that nothing of moment happened in that campaign. This rendered him strongly suspected of having betrayed his country, after the example of his predecessors. His brother Aulus, who succeeded him in the command of the army, was still more unsuccessful; for after raising the siege of Suthul, where the king's treasures were deposited, he marched his forces into a defile, out of which he found it impossible to extricate himself. He was therefore obliged to submit to the ignominious ceremony of passing under the yoke, with all his men, and to quit Numidia entirely in ten days' time, in order to deliver his troops from immediate destruction. The avaricious disposition of the Roman commander had prompted him to besiege Suthul, the possession of which place, he imagined, would make him master of all the wealth of Jugurtha, and consequently paved the way to the scandalous convention just mentioned. However, this was declared void as soon as known at Rome, from being concluded without the authority of the people. The Roman troops retired into Africa Propria, which they had now reduced into the form of a Roman province, and there took up their winter quarters.

In the mean time Caius Mamilius Limetanus, a tribune of the people, excited the plebeians to inquire into the conduct of those persons by whose assistance Jugurtha had found means to elude all the decrees of the senate.

This threw the body of the people into a great ferment, and occasioned a prosecution of the guilty senators, which was carried on, for some time, with the utmost heat and violence. Lucius Metellus, the consul, during these transactions, had Numidia assigned him as his province, and consequently was appointed general of the army destined to act against Jugurtha. As he perfectly disregarded wealth, the Numidian found him superior to all his temptations; and to this contempt of money he joined all the other virtues which constitute the great captain, so that Jugurtha found him in all respects inaccessible. That prince, therefore, was now forced to regulate his conduct with the greatest caution, according to the motions of Metellus; and to exert his utmost bravery, in order to compensate for that expedient, hitherto so favourable, which now began to fail him. Marius, Metellus's lieutenant, being likewise a person of uncommon merit, the Romans reduced Vacca, a large and opulent city, and the most celebrated mart in Numidia. They also defeated Jugurtha in a pitched battle; overthrew Bomilcar, one of his generals, upon the banks of the Muthullus; and, in fine, forced the Numidian monarch to take shelter in a place rendered almost inaccessible by the rocks and woods with which it was covered. However, Jugurtha signalized himself in a surprising manner, exhibiting all that could be expected from the courage, abilities, and attention of a consummate general, to whom despair administers fresh strength, and suggests new resources. But his troops could not make head against the Romans, and were again worsted by Marius, though they obliged Metellus to raise the siege of Zama. Jugurtha, therefore, finding his country everywhere ravaged, his most opulent cities plundered, his fortresses reduced, his towns burned, and vast numbers of his subjects put to the sword and taken prisoners, began to think seriously of coming to an accommodation with the Romans. His favourite, Bomilcar, in whom he reposed the highest confidence, but who had been gained over to the enemy by Metellus, observing this disposition, found it no difficult matter to persuade him to deliver up his elephants, money, arms, horses, and deserters, in whom the main strength of his army consisted, into the hands of the Romans. Some of these last, in order to avoid the punishment due to their crime, retired to Bocchus, king of Mauritania, and enlisted into his service. But Metellus, having ordered him to repair to Tisidium, a city of Numidia, there to receive farther directions, Jugurtha refused to comply with that order, and hostilities were renewed with greater fury than ever. Fortune now seemed to declare in favour of Jugurtha, who retook Vacca, and massacred all the Roman garrison, except Turpilius the commandant. However, a Roman legion soon afterwards retook the place, and treated the inhabitants with the utmost severity. About this time, one of Mastanabal's sons, named Gauda, whom Micipsa in his will had appointed to succeed to the crown in case his two legitimate sons and Jugurtha died without issue, wrote to the senate in favour of Marius, who was then endeavouring to supplant Metellus. That prince having his understanding impaired by a declining state of health, fell a more easy prey to the base and infamous adulation of Marius. The Roman, soothing his vanity, assured him, that as he was the next heir to the crown, he might depend upon being fixed upon the Numidian throne as soon as Jugurtha was either killed or taken; and that this must in a short time happen, when once he appeared at the head of the Roman army with an unlimited commission. Soon afterwards, Bomilcar and Nabdalsa formed a design to assassinate Jugurtha, at the instigation of Metellus; but this being detected, Bomilcar and most of his accomplices suffered death. The plot, however, had such an effect upon Jugurtha, that he afterwards enjoyed no tranquillity or repose. He suspected

Numidia. persons of all denominations, Numidians as well as foreigners, of some black designs against him; and perpetual terror sat brooding over his mind, insomuch that he never slept except by stealth, and often changed his bed in a low plebeian manner. Starting from his sleep, he would frequently snatch his sword, and break out into the most doleful cries; so strongly was he haunted by a spirit of fear, jealousy, and distraction.

Jugurtha having destroyed great numbers of his friends on suspicion of their having been concerned in this conspiracy, and many more of them having deserted to the Romans and Bocchus king of Mauritania, he found himself, in a manner, destitute of counsellors, generals, and all persons capable of assisting him in carrying on the war. This threw him into a deep melancholy, which rendered him dissatisfied with every thing, and made him fatigue his troops with a variety of contradictory movements. Sometimes he would advance with great rapidity against the enemy, and at others retreat from them with no small celerity. Then he resumed his former courage, but soon afterwards despaired either of the valour or fidelity of the forces under his command. All his movements, therefore, proved unsuccessful, and at last he was forced by Metellus to accept battle. That part of the Numidian army which Jugurtha commanded behaved with some resolution, but the other fled at the first onset. The Romans, therefore, entirely defeated them, took all their standards, and made some prisoners. But few of them were slain in the action, since, as Sallust observes, the Numidians trusted more to their heels than to their arms for safety in this engagement.

Metellus pursued Jugurtha and his fugitives to Thala. His march to this place being through vast deserts, was extremely tedious and difficult; but being supplied with leathern bottles and wooden vessels of all sizes taken from the huts of the Numidians, which were filled with water brought by the natives who had submitted to him, he advanced towards the city. He had no sooner begun his march, than a most copious shower of rain, a thing very uncommon in these deserts, proved a great and seasonable refreshment to his troops; and this so animated them, that upon their arrival before Thala, they attacked the town with such vigour, that Jugurtha, with his family, and the treasures deposited therein, thought proper to abandon the place. After a brave defence, it was reduced; the garrison, consisting of Roman deserters, setting fire to the king's palace, and consuming themselves, together with every thing valuable to them, in the flames. Jugurtha, being now reduced to great extremities, retired into Gætulia, whence, having formed a considerable corps, he advanced to the confines of Mauritania, and engaged Bocchus, king of that country, who had married his daughter, to enter into an alliance with him; and having reinforced his Gætulian troops with a powerful body of Mauritians, he turned the tables upon Metellus, and obliged him to keep close within his intrenchments. Sallust informs us, that Jugurtha bribed Bocchus's ministers, in order to influence that prince in his favour; and having obtained an audience, he insinuated that, should Numidia be subdued, Mauritania must be involved in its ruin, especially as the Romans seemed to have vowed the destruction of all the thrones in the universe. In support of what he advanced, he produced several instances very apposite to the point in view. However, the same author seems to intimate, that Bocchus was determined to assist Jugurtha against his enemies by the slight which the Romans had formerly shown him. That prince, at the first breaking out of the war, had sent ambassadors to Rome, to propose an offensive and defensive alliance to the republic, which, though of the utmost consequence at that juncture, a few of the most venal and infamous senators, who were abandoned to corruption, prevented from taking

effect. This undoubtedly wrought more powerfully upon Bocchus in favour of Jugurtha than the relation in which he stood to him; for both the Moors and Numidians adapted the number of their wives to their circumstances, so that some of them had ten, twenty, or more. Their kings, therefore, were unlimited in this particular, and of course all degrees of affinity resulting from marriage had but little force. It is observable, that amongst the posterity of those ancient nations the same custom prevails at this day.

Such was the situation of affairs in Numidia, when Metellus received advice of the promotion of Marius to the consulate. But, notwithstanding this injurious treatment, he generously endeavoured to draw off Bocchus from Jugurtha, although this would facilitate the reduction of Numidia for his rival. To this end ambassadors were despatched to the Mauritanian court, who intimated to Bocchus, "that it would be highly imprudent to come to a rupture with the Romans without any cause at all; and that he had now a fine opportunity of concluding a most advantageous treaty with them, which was much preferable to a war." To this they added, "that whatever dependence he might place upon his riches, he ought not to run the hazard of losing his dominions by embroiling himself with other states, when he could easily avoid doing so; that it was much easier to begin a war than to end it, which it was in the power of the victor alone to do; that, in fine, he would by no means consult the interest of his subjects if he followed the desperate fortunes of Jugurtha." To this Bocchus replied, "that for his part there was nothing he wished for more than peace, but that he could not help pitying the deplorable condition of Jugurtha; that if the Romans, therefore, would grant to that unfortunate prince the same terms which they had offered him, he would bring about an accommodation." Metellus let the Mauritanian monarch know, that it was not in his power to comply with what he desired; but he nevertheless took care to keep up a private negotiation with him till the arrival of the new consul Marius. By this conduct he gained two important objects. First, he prevented Bocchus from coming to a general action with his troops; which was the very thing Jugurtha desired, hoping that this, whatever the event might be, would render a reconciliation between him and the Romans impracticable. Secondly, this inaction enabled him to discover something of the genius and disposition of the Moors, a nation of whom the Romans, till then, had scarcely formed any idea; and this, he imagined, might be of no small service, either to himself or his successors, in the future prosecution of the war.

Jugurtha, being informed that Marius, with a numerous army, had landed at Utica, advised Bocchus to retire, with part of the troops, to some place of difficult access, whilst he himself took post upon another inaccessible spot with the remaining corps. By this measure, he hoped the Romans would be obliged to divide their forces, and consequently be more exposed to his efforts and attacks. He likewise imagined, that seeing no formidable body appear, they would believe that the enemy were not in a condition to make head against them; which might occasion a relaxation of discipline, the usual attendant of too great security, and consequently produce some good effect. However, he was disappointed in both these views. For Marius, so far from suffering a relaxation of discipline to take place, trained up his troops, which consisted chiefly of new levies, in so perfect a manner, that they were soon equal in efficiency to any consular army that ever appeared in the field. He also cut off great numbers of the Gætulian marauders, defeated many of Jugurtha's parties, and had well nigh captured that prince himself near the city of Cirta. These advantages, though not of any great importance, intimidated Bocchus, who now made overtures for an accom-

Numidia. modulation; but the Romans, not being sufficiently satisfied of his sincerity, paid no great attention to them. In the mean time Marius pushed on his conquests, and having reduced several places of less note, at last resolved to besiege Capsa. That this enterprise might be conducted with the greater secrecy, he suffered not the least hint of his design to transpire, even amongst any of his officers. On the contrary, in order to blind them, he detached A. Manlius, one of his lieutenants, with some light-armed cohorts, to the city of Lares, where he had fixed his principal magazine, and deposited the military chest. Before Manlius left the camp, that he might the more effectually amuse him, he intimated, that he himself with the army would take the same route in a few days; but instead of that, he bent his march towards the Tanais, and in six days' time arrived upon the banks of that river. Here he pitched his tents for a short time, in order to refresh his troops; after which he advanced to Capsa, and made himself master of the place. As the situation of this city rendered it extremely commodious to Jugurtha, whose plan of operations, ever since the commencement of the war, it had exceedingly favoured, Marius levelled it with the ground after it had been delivered up to the soldiers to be plundered. The citizens, likewise, being more strongly attached to that prince than any of the other Numidians, on account of the extraordinary privileges he indulged them with, and of course bearing a more implacable hatred to the Romans, he put to the sword or sold for slaves. The true motive of the consul's conduct on this occasion seems to have been that assigned; though we are told by Sallust, in conformity to the Roman genius, that neither avarice nor resentment prompted him to so barbarous an action, but only a desire to strike terror into the Numidians.

The Numidians, ever after this exploit, dreaded the very name of Marius; who now, in his own opinion, had eclipsed the glory of all the great achievements of his predecessor, particularly the reduction of Thala, a city in strength and situation nearly resembling Capsa. Following up this blow, he gradually presented himself before most of the places of strength in the enemy's country, many of which either opened their gates or were abandoned at his approach, being terrified at what had happened to the unfortunate citizens of Capsa. Others taken by force he laid in ashes, and, in short, filled the greatest part of Numidia with blood, horror, and confusion. Then, after an obstinate defence, he reduced a castle which seemed impregnable, being situated not far from Mulucha, where Jugurtha kept part of his treasures. In the mean time, Jugurtha not being able to prevail upon Bocchus, by his repeated solicitations, to advance into Numidia, where he found himself greatly pressed, was obliged to have recourse to his usual method of bribing the Mauritanian ministers, in order to put that prince in motion. He also promised him a third part of his kingdom, provided they could either drive the Romans out of Africa, or get all the Numidian dominions confirmed to him by treaty.

So considerable a cession could scarcely fail to engage Bocchus to support Jugurtha with his whole power. The two African monarchs, therefore, having joined their forces, surprised Marius near Cirta as he was going into winter quarters. The Roman general was so hard pushed on this occasion, that the barbarians thought themselves certain of victory, and doubted not but they should be able to extinguish the Roman name in Numidia. But their want of caution, and too great security, enabled Marius to inflict on them a total defeat; which was followed four days afterwards by so complete an overthrow, that their numerous army, consisting of ninety thousand men, by the accession of a powerful corps of Moors, commanded by Bocchus's son Volux, was entirely ruined. Sylla, the lieutenant of Marius, most eminently distinguished himself in the last action, which laid the foundation of his future greatness. Bocchus,

now looking upon Jugurtha's condition as desperate, and not being willing to run the risk of losing his dominions, showed a disposition to conclude a peace with Rome. However, the republic gave him to understand, that he must not expect to be ranked amongst its friends, until he had delivered up into the consul's hands Jugurtha, the inveterate enemy of the Roman name. The Mauritanian monarch, having entertained a high idea of an alliance with that state, resolved to satisfy it in this particular; and was confirmed in his resolution by one Dabar, a Numidian prince, the son of Masugrada, and descended by his mother's side from Masinissa. Being closely attached to the Romans, and extremely agreeable to Bocchus on account of his noble disposition, he defeated all the intrigues of Aspar, the minister of Jugurtha. Upon Sylla's arrival at the Mauritanian court, the affair there seemed to be entirely settled. However, Bocchus, who was continually projecting new designs, and, like the rest of his countrymen, in the highest degree perfidious, debated within himself whether he should sacrifice Sylla or Jugurtha, who were then both in his power. He was a long time fluctuating in uncertainty, and distracted by a contrariety of sentiments. The sudden changes which displayed themselves in his countenance, his air, and his whole person, evidently showed how strongly his mind was agitated. But at last he returned to his first design, to which the bias of his mind seemed naturally to lead him. He therefore delivered up Jugurtha into the hands of Sylla, to be conducted to Marius, who, by that important event, happily terminated this dangerous war. The kingdom of Numidia was now reduced to a new form. Bocchus, for his important services, had the country of the Massæyli, contiguous to Mauritania, assigned him, and which, from this time, took the name of New Mauritania. Numidia Propria, or the country of the Massyli, was divided into three parts; one of which was given to Hiempsal, and another to Mandrestal, both descendants of Masinissa; and the third part the Romans annexed to Africa Propria, or the Roman province adjacent to it.

Jugurtha's two sons survived him, but spent their lives in captivity at Venusia. One of them, however, named Oxyntas, was, for a short time, released from his confinement by Aponius, who besieged Acerræ, in the war between the Romans and the Italian allies. That general brought this prince to his army, where he treated him as king, in order to draw off the Numidian forces from the Roman service. Accordingly, those Numidians no sooner heard that the son of their old king was fighting for the allies, than they began to desert by companies; a circumstance which obliged Julius Cæsar the consul to part with all his Numidian cavalry, and send them back into Africa. Some few years after this event, Pompey defeated Cneius Domitius Ahenobarbus, and Hiarbas one of the kings of Numidia, killing seventeen thousand of their men upon the field of battle; and, not satisfied with this victory, that general pursued the fugitives to their camp, which he soon forced, and, having put Domitius to the sword, took Hiarbas prisoner. He then reduced that part of Numidia which belonged to Hiarbas, who seems to have succeeded Mandrestal above mentioned, and gave it to Hiempsal, a neighbouring Numidian prince, descended from Masinissa, who had always opposed the Marian faction.

Suetonius informs us, that a dispute happened between Hiempsal and one Masintha, a noble Numidian, whom, it is probable, he had in some respect injured, at the time when Julius Cæsar first began to make a figure in the world. The same author adds, that Cæsar warmly espoused the cause of Masintha, and even grossly insulted Juba, Hiempsal's son, when he attempted to vindicate his father's conduct on this occasion. He pulled him by the beard, than which a more unpardonable affront could not be offered to an African. In short, he screened Masintha from the insults

Numidia. and violence of his enemies; and from this cause a reason may be assigned for Juba's adhering so closely afterwards to the Pompeian faction.

In consequence of the indignity Cæsar had offered Juba, and the disposition it had occasioned, that prince did Cæsar great damage in the civil wars between him and Pompey. By a stratagem he drew Curio, one of his lieutenants, into a general action, which it was his interest at that time to have avoided. He caused it to be given out over all Africa Propria and Numidia, that he had retired into some remote country at a great distance from the Roman territories. This coming to Curio's ears, who was then besieging Utica, hindered him from taking the necessary precautions against a surprise. Soon afterwards, the Roman general receiving intelligence that a small body of Numidians was approaching his camp, put himself at the head of his forces in order to attack them, and, for fear they should escape, began his march in the night, looking upon himself as certain of victory. Some of their advanced posts he surprised asleep, and cut them to pieces, which still farther animated him. In short, about daybreak he came up with the Numidians, whom he attacked with great bravery, though his men were then fasting, and greatly fatigued by their forced and precipitate march. In the mean time, Juba, who immediately after the propagation of the rumour above mentioned had taken care to march privately, with the main body of the Numidian army, to support the detachment sent before to decoy Curio, advanced to the relief of his men. The Romans had met with a vigorous resistance before he appeared, so that he easily broke them; killed Curio, with a great part of his troops, upon the spot; pursued the rest to their camp, which he plundered; and took many of them prisoners. Most of the fugitives, who endeavoured to make their escape on board the ships in the port of Utica, were either slain by the pursuers, or drowned in the attempt. The remainder fell into the hands of Varus, who would have saved them; but Juba, who arrogated to himself the honour of this victory, ordered most of them to be put to the sword.

This victory infused new life and vigour into the Pompeian faction, who thereupon conferred great honours upon Juba, and gave him the title of king of all Numidia. But Cæsar and his adherents declared him an enemy to the state of Rome, adjudging to Bocchus and Bogud, two African princes entirely in their interest, the sovereignty of his dominions. Juba afterwards, uniting his forces with those of Scipio, reduced Cæsar to great extremities, and would, in all probability, have totally ruined him, had he not been relieved by Publius Sittius. That general, having formed a considerable corps, consisting of Roman exiles, and Mauritanian troops sent him by Bocchus, according to Dio, or, as Cæsar will have it, Bogud, made an irruption into Gætulia and Numidia, whilst Juba was employed in Africa Propria. As he ravaged these countries in a dreadful manner, Juba immediately returned with the best part of his army, in order to preserve them from utter destruction. However, Cæsar knowing that his horse were afraid of the enemy's elephants, did not think proper to attack Scipio in the absence of the Numidian, till his own elephants, and a fresh reinforcement of troops, hourly expected, arrived from Italy. With this accession of strength, he imagined himself able to give a good account, both of the Roman forces with which he was to cope, and of the barbarians. In the mean time Scipio despatched reiterated expresses to Juba to hasten to his assistance, but could not prevail upon him to move out of Numidia, till he had promised him the possession of all the Roman dominions in Africa if they could expel Cæsar from thence. This immediately put him in motion; so that, having sent a large detachment to make head against Sittius, he marched with the rest of his troops to assist Scipio. However, Cæsar at last overthrew

Scipio, Juba, and Labienus, near the town of Thapsus, and forced all their camps. As Scipio was the first surprised and defeated, Juba fled into Numidia without waiting for Cæsar's approach; but the body of the Numidians detached against Sittius having been broken and dispersed by that general, none of his subjects there would receive him. Abandoned to despair, he sought death in a single combat with Petreius, and having killed him, caused himself to be despatched by one of his slaves.

After this decisive action, and the reduction of all Africa Propria, Cæsar made himself master of Numidia, which he reduced to a Roman province, appointing Crispus Sallustius to govern it in quality of proconsul, with private instructions to pillage and plunder the inhabitants, and by these means put it out of their power ever to shake off the Roman yoke. However, Bocchus and Bogud still preserved a sort of sovereignty in the country of the Massæsyli and Mauritania; since the former of these princes, having deserted Cæsar, sent an army into Spain to assist the Pompeians; and the latter, with his forces, determined victory in favour of Cæsar at the memorable battle of Munda. Bogud, afterwards siding with Antony against Octavius, sent a body of forces to assist him in Spain; but at this time the Tingitanians having revolted from him, Bocchus, with an army composed of Romans in the interest of Octavius, who passed over from Spain into Africa, and his own subjects, possessed himself of Mauritania Tingitana. Bogud fled to Antony; and Octavius, after the conclusion of the war, honoured the inhabitants of Tingi with all the privileges of Roman citizens. He likewise confirmed Bocchus king of Mauritania Cæsariensis, or the country of the Massæsyli, in the possession of Tingitana, which he had conquered, as a reward for his important services. In this he imitated the example of his great predecessor Julius Cæsar, who divided some of the fruitful plains of Numidia amongst the soldiers of Sittius, who had conquered the greater part of that country, and appointed Sittius himself sovereign of that district. Sittius, as has been intimated above, having taken Cirta, killed Sabura, Juba's general, entirely dispersed his forces, and either cut off or taken prisoners most of the Pompeian fugitives who escaped from the battle of Thapsus, highly deserved to be distinguished in so eminent a manner. After the death of Bocchus, Mauritania and the Massæsylian Numidia were in all respects considered as Roman provinces.

NUMISMATOGRAPHIA, a term applied to the description and knowledge of ancient coins and medals, whether of gold, silver, or brass.

NUN, the son of Elishamah, and father of Joshua, of the tribe of Ephraim. The Greeks gave him the name of *Nane* instead of Nun. This person is only known in sacred history by having been the father of Joshua.

NUN, a woman, in several Christian countries, who devotes herself, in a cloister or nunnery, to a religious life. There were women, in the ancient Christian church, who made public profession of virginity, before the monastic life was known in the world, as appears from the writings of Cyprian and Tertullian. These, for distinction's sake, are sometimes called "ecclesiastical virgins," and were commonly enrolled in the canon or matricula of the church. They differed from the monastic virgins chiefly in this, that they lived privately in their fathers' houses, whereas the others lived in communities; but their profession of virginity was not so strict as to make it criminal for them afterwards to marry, if they thought fit. As to the consecration of virgins, it had some things peculiar in it, and was usually performed publicly in the church by the bishop. The virgin made a public profession of her resolution, and then the bishop put upon her the accustomed habit of sacred virgins. One part of this habit was a veil called the *sacrum velamen*; and another was a kind of mitre or coronet

Numisma-
tographia
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Nun.

Nuncio
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Nunia.

worn upon the head. At present, when a woman is to be made a nun, the habit, veil, and ring of the candidate are carried to the altar; and she herself, accompanied by her nearest relations, is conducted to the bishop, who, after mass and an anthem, pronounces the benediction; upon which she rises up, and the bishop consecrates the new habit, sprinkling it with holy water. When the candidate has put on her religious habit, she presents herself before the bishop, and sings, on her knees, *Ancilla Christi sum*; then she receives the veil, and afterwards the ring, by which she is married to Christ; and, lastly, the crown of virginity. When she is crowned, an anathema is denounced against all who shall attempt to induce her to break her vows.

NUNCIO, or NUNTIO, an ambassador from the pope to some Catholic prince or state, or a person who attends on behalf of the pope at a congress, or an assembly of several ambassadors.

NUNCUPATIVE, in the schools, means something that is only nominal, or has no existence but in name.

NUNCUPATIVE *Will or Testament*, a will made verbally, and not put in writing.

NUNDABAR, a town of Hindustan, in the province of Khandesh, belonging to the Mahrattas, seventy-six miles east from Surat. Long. 74. 15. E. Lat. 21. 17. N.

NUNDAPORAM, a town of Hindustan, in the Northern Circars, and district of Cicacole, eighty-two miles west from Cicacole. Long. 82. 40. E. Lat. 18. 23. N.

NUNDINA, a goddess amongst the ancient heathens, supposed to have had the care of the purification of infants. Because male infants were purified nine days after their birth, her name is derived from *nonus*, or the ninth; although female infants were also purified on the eighth day, which purification was by the Romans called *lustration*.

NUNDINAL, *Nundinalis*, a name which the Romans gave to the first eight letters of the alphabet, which were used in their calendar. This series of letters, A, B, C, D, E, F, G, H, is placed and repeated successively from the first to the last day of the year; and one of these always expressed the market-days or the assemblies called *nundinæ* (quasi *novendinæ*), because they returned every nine days. The country people, after working eight days successively, repaired to town on the ninth to sell their several commodities, and to inform themselves of all that related to religion and government. Thus the nundinal day being under A on the first, ninth, seventeenth, and twenty-fifth days of January, &c. the letter D will be the nundinal letter of the year following. These nundinals bear a very great resemblance to the dominical letters, which return every eight days, as the nundinals did every nine.

NUNDYDROOG, a celebrated and strong hill fortress of Hindustan, in the province of Mysore. The mountain on which it is built is 1700 feet high, and it is inaccessible on three sides. This fortress, always considered as impregnable, was stormed by the British in 1791, after a siege of three weeks. The neighbouring country is fertile, being studded with hills, in which there is much fertile land. It was long ruled by one of those independent chiefs called poligars in Southern India. He was compelled to pay tribute to Hyder Aly, who ravaged his territories and laid waste the country. Long. 77. 53. E. Lat. 13. 22. N.

NUNEATON, a town of the county of Warwick, in the hundred of Hemlingford, ninety-nine miles from London, and eight from Coventry. It stands on the river Anker, and had formerly a nunnery, to which it owes its name. It partakes of the trade of Coventry, like that place making many ribbons, and, besides, some woollen goods. There is a market on Saturday. The population amounted in 1801 to 4796, in 1811 to 4947, in 1821 to 6610, and in 1831 to 7799.

NUNIA, a village of Irak Arabi, about three quarters

of a mile from the Tigris, opposite to Mosul. It is supposed to be the site of the ancient Nineveh. The history of this metropolis is lost in succeeding ages, and it appears to have fallen into decay after the building of Babylon; indeed in the reign of Hadrian it was so completely destroyed, that even the place where it stood was unknown. A city erected afterwards near the spot was called Ninus; and Mr Kinneir is of opinion that it is the ruins of the latter, and not those of old Nineveh, that are still visible. He mentions that he examined these remains in 1810, and that they consisted of a rampart and fosse, forming an oblong square four miles in compass. The wall is on an average twenty feet in height, and is covered with grass, like the Roman intrenchments in England.

NUPTIAL RITES, the ceremonies attending the solemnization of marriage, which are different in different ages and countries. We cannot omit here a custom which was practised by the Romans on these occasions. Immediately after the principal ceremonies were ended, the new married man threw nuts about the room for the boys to scramble for. Various reasons have been assigned for this; but that which most generally prevails, and seems to be the most probable, is, that by this act the bridegroom signified his resolution to abandon trifles, and commence a serious course of life. Hence *nucibus relictis* became in this sense a proverb. The nuts might also be an emblem of fertility. The ancient Greeks had a person to conduct the bride from her own to the bridegroom's house, and hence he was called by the Greeks *Nymphagogus*, which term was afterwards used both by the Romans and the Jews.

NUREMBURG, or NURNBERG, a city of Bavaria, in the circle of the Rezat, and the bailiwick of the same name, of which it is the capital. It is situated on the river Pegnitz, which divides it into two parts. The walls are now kept in a state which renders them indefensible. It is an extensive but thinly peopled city, having much declined from the prosperity it enjoyed in the middle ages, when it was a free imperial city, and the place where the emperors occasionally resided. The city now contains 4500 houses, and 28,200 inhabitants, with eight Lutheran churches, one for the Catholics, and a chapel for the Calvinists. It has also many Jews. It is still a place of considerable manufactures, but they are chiefly on a small scale, furnishing the turnery wares called by its name, cutlery, braziers, looking-glasses, spectacles, needles, mathematical, musical, and surgical instruments, watches, leaf gold and silver, paper, maps, and other articles. It is celebrated as the birthplace of Albert Durer the painter, and the residence of Rudolph the inventor of wire, of Peter Hele the inventor of watches, of Denner the inventor of the clarionet, of Ebner the first cutler, and of Behairn, who first constructed globes. Long. 11. 1. 4. E. Lat. 49. 27. 8. N.

NURPOOR, a town of Hindustan, in the province of Lahore, and capital of a district of the same name. It is situated on the top of a hill, which is ascended by stone steps, and has all the appearance of opulence and industry. It is the residence of a Sikh chief, whose revenue amounts to L.50,000 a year. The district is situated between the thirty-second and thirty-third degrees of north latitude. It belongs to the Sikhs. The city is seventy-five miles east-north-east from the city of Lahore.

NURRAH, a town of Hindustan, in the province of Gundwana, tributary to the Nagpoor rajah, and possessed by native Goand chiefs. It is seventy-eight miles south by east from Ruttunpoor. Long. 82. 45. E. Lat. 21. 2. N.

NURSERY, in *Gardening*, is a piece of land set apart for raising and propagating all sorts of trees and plants to supply the garden and other plantations.

NURSING OF CHILDREN. The following observations and directions were published in the Annual Register (vol. vi. p. 130), as the results of long experience, The

Nuptial
Rites
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Nursing of
Children.

Nusance. child should be laid, the first month, upon a thin mattress, rather longer than itself, which the nurse should keep upon her lap, that the child may always lie straight, and only sit up as the nurse slants the mattress. To set a child quite upright before the end of the first month, would hurt the eyes, by making the white part of the eye appear below the upper eyelid. Afterwards the nurse will begin to set it up and dance it by degrees. The child must be kept as dry as possible.

The clothing should be very light, and not much longer than the child, that the legs may be got at with ease, in order to have them often rubbed in the day with a warm hand or flannel, and in particular the inside of them.

Rubbing a child all over takes off scurf, and causes the blood to circulate. The one breast should be rubbed with the hands one way, and the other the other way, night and morning at least.

The ankle bones and the inside of the knees should be rubbed twice a day; this will strengthen those parts, and make the child stretch its knees and keep them flat, which is the foundation of an erect and graceful person.

A nurse ought to keep a child as little in her arms as possible, lest the legs should be cramped, and the toes turned inwards. Further, she should always keep the child's legs loose. The oftener the posture is changed the better. Tossing a child about, and exercising it in the open air in fine weather, is of the greatest service. In cities, children are not to be kept in hot rooms, but to have as much air as possible. Want of exercise is the cause of large heads, weak and knotted joints, a contracted breast, which occasions coughs and stuffed lungs, an ill-shaped person, and waddling gait, besides a numerous train of other ills.

The child's flesh is to be kept perfectly clean, by constantly washing its limbs, and likewise its neck and ears, beginning with warm water, till by degrees it will not only bear, but like to be washed with cold water.

Rising early in the morning is good for all children, provided they awake of themselves, which they generally do; but they are never to be waked out of their sleep, and as soon as possible to be brought to regular sleeps in the day. When laid in bed or in cradle, their legs are always to be laid straight.

Children, till they are two or three years old, must never be suffered to walk long enough at a time to be weary.

Girls might easily be trained to the proper management of children, if a premium were given in free schools, work-houses, and other places, to those that brought up the finest child to one year old.

If the mother cannot suckle the child, get a wholesome cheerful woman with young milk, who has been used to attend young children. After the first six months, small broths, and innocent foods of any kind, may do as well as living wholly upon milk. A principal thing to be always attended to is, to give young children constant exercise, and to keep them in a proper posture.

With regard to the child's dress in the day, let it be a shirt, a petticoat of fine flannel two or three inches longer than the child's feet, with a dimity top, commonly called a boddice coat, to tie behind; and over that a surcingle made of fine buckram, two inches broad, covered over with satin or fine ticken, with a ribbon fastened to it to tie it on, which answers every purpose of stays, and has none of their inconveniences. Over this put a robe, or a slip and frock, or whatever you like best, provided it is fastened behind, and not much longer than the child's feet, that their motions may be strictly observed. Two caps are to be put on the head, till the child has got most of its teeth. The child's dress for the night may be a shirt, a blanket to tie on, and a thin gown to tie over the blanket.

NUSANCE, or **NUISANCE**, in *Law*, a thing done to the annoyance of another. Nuisances are either public or pri-

vate. A public nuisance is an offence against the public in general, either by doing what tends to the annoyance of all the king's subjects, or by neglecting to do what the common good requires; in which case, all annoyances and injuries to streets, highways, bridges, and large rivers, as also disorderly ale-houses, gaming-houses, and the like, are held to be common nuisances. A private nuisance is, when only one person or family is annoyed by the doing of any thing; as where a person stops up the light of another's house, or builds in such a manner that the rain falls from his house upon his neighbour's.

NUSSERABAD, a town of Hindustan, in the Mahratta dominions, and province of Berar, forty-two miles southwest from Burhampoor. Long. 75. 51. E. Lat. 20. 56. N.

NUSSERITABAD, or **SACKUR**, a town of Hindustan, in the province of Bejapore, belonging to the nizam.

NUSSERPOOR, a town of Hindustan, in the province of Sinde, and the capital of a district of the same name, situated near the banks of the Indus. Long. 69. 10. E. Lat. 25. 28. N. The district is situated principally between the twenty-sixth and twenty-seventh degrees of north latitude, and is intersected by the river Indus.

NUT, among botanists, denotes a *pericarpium* of an extraordinary hardness, enclosing a kernel or seed.

NUTATION, in *Astronomy*, a kind of tremulous motion of the axis of the earth, by which, in each annual revolution, it is twice inclined to the ecliptic, and as often returns to its former position.

NUTHUIRS, a village of Persia, in the province of Irak, situated on a small plain surrounded with mountains, on the road from Ispahan to Sultania, and sixty-three miles north from Ispahan.

NUTMEG, the fruit of a tree, and a well-known spice. See **MYRISTICA**.

NUTRITION, in the animal economy, is the repairing the continual loss which the different parts of the body undergo. The motion of the parts of the body, the friction of these parts against each other, and especially the action of the air, would destroy the body entirely, if the loss was not repaired by a proper diet containing nutritive juices, which being digested in the stomach, and afterwards converted into chyle, mix with the blood, and are distributed throughout the whole body for its nutrition.

Buffon, in order to account for nutrition, supposes the body of an animal or vegetable to be a kind of mould, in which the matter necessary to its nutrition is modelled and assimilated to the whole. But of what nature is this matter which an animal or a vegetable assimilates to its own substance? What power is it that communicates to this matter the activity and motion necessary to penetrate this mould? and, if such a force exist, would it not be by a similar force that the internal mould itself might be reproduced?

As to the first question, he supposes that there exists in nature an infinite number of living organical parts, and that all organized bodies consist of such organical parts; that their production costs nature nothing, since their existence is constant and invariable; so that the matter which the animal or vegetable assimilates to its substance is an organical matter of the same nature with that of the animal or vegetable, which consequently may augment its volume without changing its form or altering the quality of the substance in the mould.

As to the second, there exist in nature certain powers, as that of gravity, which have no affinity with the external qualities of the body, but act upon the most intimate parts, and penetrate them throughout, and which can never fall under the observation of our senses.

And as to the third, he conceives that the internal mould itself is reproduced, not only by a similar power, but by the very same power which causes the unfolding and reproduc-

Nussera-
bad
||
Nutrition.

Nux
Vomica
||
Nuyts.

tion thereof. For it is sufficient, he thinks, that, in an organized body which unfolds itself, there should be some part similar to the whole, in order that this part may one day become itself an organized body, altogether like that of which it is actually a part.

NUX VOMICA, a flat, compressed, round fruit, about the breadth of a shilling, brought from the East Indies. It is found to be a certain poison for dogs, cats, and other animals, and it is not to be doubted that it would also prove fatal to man. Its surface is not much corrugated, and its texture is firm like horn, and of a pale grayish-brown colour. It is said to be used as a specific against the bite of a species of water-snake. It is considerably bitter and deleterious; but has been used in doses of from five to ten grains twice a day or so, in intermittents, particularly obstinate quartans, and in contagious dysentery. The *strychnus Ignatii* is a tree of the same kind producing gourd-like fruit, the seeds of which are improperly called St Ignatius's beans. These, as also the woods or roots of some such trees, called *lignum colubrinum*, or snakewood, are very narcotic bitters, like the *nux vomica*.

NUYTS, PETER, a native of Holland, and a leading character in that extraordinary transaction which happened between the Japanese and the Dutch about the year 1628. In 1627 Nuyts arrived in Batavia from Holland, and was in the same year appointed ambassador to the emperor of Japan, by the governor and council of Batavia. He repaired to that empire in 1628; and being a man of a haughty disposition, and extremely vain, he believed it practicable to pass upon the natives for an ambassador from the king of Holland. Upon his assuming this title and rank, he was much more honourably received, caressed, and respected than former ministers had been. But he was soon detected, reprimanded, and reproached in the severest manner, sent back to the port, and ordered to return to Batavia with all the circumstances of disgrace imaginable; notwithstanding which, his interest was so great, that, instead of being punished as he deserved, he was immediately afterwards promoted to the government of the island of Formosa, of which he took possession in the following year. He entered upon the administration of affairs in that island with the same disposition that he had shown whilst ambassador, and with the most implacable resentment against the Japanese; neither was it long before an opportunity offered, as he thought, of revenging himself on them to the full. Two large Japanese ships, with upwards of five hundred men on board, came into the port, upon which he took it into his head to disarm and unrig them, in the same manner as the Dutch vessels are treated at Japan. The Japanese did all they could to defend themselves from this ill usage; but at last, for want of water, they were forced to submit. Governor Nuyts went still farther. When they had finished their affairs at Formosa, and were desirous of proceeding, according to their instructions, to China, he put them off with fair words and fine promises, till the monsoon was over. They then began to be very impatient, and desired to have their cannon and sails restored, that they might return home; but the governor had recourse to new artifices, and, by a series of false promises, endeavoured to prevent them from making use of the season most proper for that voyage. The Japanese, however, soon perceived his design, and at length, by a bold attempt, accomplished what, by fair means and humble entreaty, they could not obtain; for, by a daring and well concerted effort, they took him prisoner, and compelled him and one of the council to sign a treaty for securing their liberty, free departure, and indemnity, which was afterwards ratified by the whole council. Nuyts was first confined in Batavia, and afterwards delivered up to the Japanese, notwithstanding the most earnest entreaties on his part to be tried, and even to suffer any kind of

death, where he was, rather than to be sent to Japan. Thither, however, he was sent in 1634, when he was submitted to the mercy or discretion of the emperor; and the consequence was, that, though imprisoned, he was well used, and could go anywhere, provided his guards were with him, which was more than he could possibly have expected. He now looked for nothing but the continuance of his confinement for life. On a particular occasion, however, namely, the funeral of the emperor's father, he was, at the request of the Dutch, set free, and returned again to Batavia, to the surprise of the people of that settlement, who adopted ever afterwards a very different conduct with respect to the Japanese.

NUYTS' REEFS, several large reefs of rocks which lie off the south coast of New Holland, at Cape Nuyts. These reefs are about eight miles distant from the coast, and are eight miles in length. In some places the rocks rise above the water, and in others they are wholly concealed. Long. of Cape Nuyts, 132. 18. E. Lat. 32. 2. S.

NUZZER, or MUZZERANAH, a present or offering from an inferior to a superior. In Hindustan no man ever approaches his superior for the first time on business without an offering of at least a gold or silver rupee in his right hand; and if this be not taken, it is a mark of disfavour. Nuzzeranah is also used to signify the sum paid to the government as an acknowledgment for a grant of lands or any public office.

NYCHTHEMERON, amongst the ancients, signified the whole natural day, or day and night, consisting of twenty-four hours, or twenty-four equal parts. This way of considering the day was particularly adopted by the Jews, and seems to have owed its origin to the expression of Moses in the first chapter of Genesis, "The evening and the morning were the first day." Before the Jews had introduced the Greek language into their discourse, they were accustomed to indicate this space of time by the simple expression of a night and a day.

It is proper here to observe, that in all the eastern countries any part of a day of twenty-four hours was reckoned for a whole day; and that a thing which was done on the third or seventh day from that last mentioned, was said to be done after three or seven days. The Hebrews, having no word which exactly answered to the Greek *Nyxthēmeron*, signifying a natural day of twenty-four hours, used *night and day*, or *day and night*, instead of it; so that to say a thing happened after three days and three nights, was, with them, the same as to say that it happened after three days, or on the third day. This being remembered, will explain what is meant by "the Son of Man's being three days and three nights in the heart of the earth."

NYCTASTRATEGI, amongst the ancients, were officers appointed to prevent fires in the night, or to give alarm and call assistance when a fire broke out. At Rome they had the command of the watch, and were called *nocturni triumviri*, from their office and number.

NYIREGYHAZA, a town of the circle of Szaboles, in the province of Farther Theiss, in Hungary. It contains a Catholic, a Lutheran, a Calvinist, and an Unitarian church, a public grammar-school, 1100 houses, and 8066 inhabitants, who are employed in cultivating the vine, and in several trades. Long. 22. 38. 10. E. Lat. 47. 56. 45. N.

NYKOPING, a province of the west of Sweden, which extends in north latitude from 58. 36. to 59. 30., and in east longitude from 15. 28. to 17. 33., and contains 2977 square miles. It comprises seven cities or towns, and 3327 detached settlements, with 98,500 inhabitants. It is a district of mountains and lakes, intermingled with extensive woods, but barely produces corn sufficient for its scanty population. The chief occupation consists in copper and iron mines, and in the fishery. The capital is a city of the same name, situated on a bay in the Baltic Sea.

Nuyts'
Reefs
||
Nykoping.

Nylacky It is a well-built town, and has a market-place, surrounded with houses of stone, but most of the others are of wood. It contains two churches, and 520 dwellings, with 2490 inhabitants, who make cutlery and bar iron, and export large quantities of deals and other wood. Long. 16. 57. 10. E. Lat. 58. 45. 30. N.

NYLACKY, one of the Banda Islands, in the Eastern Seas. Long. 130. 33. E. Lat. 4. 11. S.

NYMPH, in *Mythology*, an appellation given to certain inferior goddesses, inhabiting the mountains, woods, and waters, and said to have been the daughters of Oceanus and Tethys. All the universe was represented as full of these nymphs, who were distinguished into several ranks or classes. The general division of them was into celestial and terrestrial. The former were called *Urania*, and were supposed to be intelligences which governed the heavenly bodies or spheres. The terrestrial nymphs, called *Epigeia*, were believed to preside over the several parts of the inferior world, and were divided into those of the water and those of the earth. The nymphs of the water were the *Oceanitides*, or nymphs of the ocean; the *Nereids*, or the nymphs of the sea; the *Naiads* and *Ephydriades*, or the nymphs of the fountains; and the *Limniades*, or the nymphs of the lakes. The nymphs of the earth were the *Oreades*, or nymphs of the mountains; the *Napææ*, or nymphs of the meadows; and the *Dryads* and *Hamadryads*, who were nymphs of the forests and groves. Besides these, we meet with nymphs who took their names from particular countries, rivers, and places.

"The nymphs," says Dr Chandler, "were supposed to enjoy longevity, but not to be immortal. They were believed to delight in springs and fountains. They are described as sleepless, and as dreaded by the country people. They were susceptible of passion. The Argonauts, it is related, landing on the shore of the Propontis to dine, in their way to Colchis, sent Hylas, a boy, for water, who discovered a lonely fountain, in which the nymphs Eunice, Malis, and Nycheia, were preparing to dance; and these seeing him were enamoured, and, seizing him by the hand as he was filling his vase, pulled him in. The deities, their copartners in the cave, are such as presided with them over rural and pastoral affairs.

"The old Athenians were ever ready to cry out, a god, or a goddess. The tyrant Pisistratus entered the city in a chariot with a tall woman dressed in armour to resemble Minerva, and regained the Acropolis, which he had been forced to abandon, by this stratagem; the people worshipping, and believing her to be the deity whom she represented. The nymphs, it was the popular persuasion, occasionally appeared; and nympholepsy is characterised as a frenzy which arose from having beheld them. Superstition disposed the mind to adopt delusion for reality, and gave to a fancied vision the efficacy of full conviction. The foundation was perhaps no more than an indirect, partial, or obscure view of some harmless girl, who had approached the fountain on a like errand with Hylas, or was retiring after she had filled her earthen pitcher.

"Amongst the sacred caves on record, one on Mount Ida in Crete was the property of Jupiter, and one by Lebadea in Bœotia, of Trophonius. Both these were oracular, and the latter bore some resemblance to that which we have described. It was formed by art, and the mouth surrounded with a wall. The descent to the landing place was by a light and narrow ladder, occasionally applied and removed. It was situated on a mountain above a grove; and the story goes, that a swarm of bees conducted the person by whom it was first discovered. But the common owners of caves were the nymphs, and these were sometimes local. On Cithæron, in Bœotia, many of the inhabitants were possessed by nymphs called *Sphragitides*, whose

cave, once also oracular, was upon a summit of the mountain. Their dwellings had generally a well or spring of water, the former being often a collection of moisture condensed or exuding from the roof and sides; and this, in many instances, being pregnant with stony particles, concreted and marked its passage by incrustation, the groundwork, in all ages and countries, of idle tales framed or adopted by superstitious and credulous people.

"A cave in Paphlagonia was sacred to the nymphs who inhabited the mountains about Heraclea. It was long and wide, and pervaded by cold water clear as crystal. There also were seen bowls of stone, and nymphs and their webs and distaffs, and curious work, exciting admiration. The poet who has described this grotto does not deserve to be regarded as servilely copying Homer; he may justly lay claim to rank as an original topographer.

"The piety of Archidamus furnished a retreat for the nymphs, where they might find shelter and provision, if distressed; whether the sun parched up their trees, or Jupiter, enthroned in clouds upon the mountain top, scared them with his red lightning and terrible thunder, pouring down a deluge of rain, or brightening the summits with his snow."

NYMPH, amongst naturalists, that state of winged insects between their living in the form of a worm and their appearing in the winged or more perfect state. See ENTOMOLOGY.

NYMPHÆA, amongst the ancients, certain structures, although it is doubtful of what kind they were. Some take them to have been grottoes, deriving their name from the statues of the nymphs with which they were adorned; but that they were considerable works, appears from their having been executed by the emperors, or by the city prefects. In an inscription, the term is written *nymfium*. None of all these *nymphæa* has remained till our time. A number of years ago, indeed, a square building of marble was discovered between Naples and Vesuvius, with only one entrance, and some steps leading down to it. On the right hand as you enter, towards the head, there is a fountain of the purest water, along which, by way of guardian, is placed a naked Arethusa of the whitest marble. The bottom or ground is of variegated marble, and encompassed with a canal fed by the water from the fountain. The walls are set round with shells and pebbles of various colours, by which are expressed the twelve months of the year, and the four political virtues, as also the rape of Proserpine; Pan playing on his reed, and soothing his flock; and the representations of nymphs swimming, sailing, and wantoning on fishes. It seems pretty evident that the *nymphæa* were public baths; for at the same time that they were furnished with pleasing grottoes, they were also supplied with cooling streams, by which they were rendered exceedingly delightful, and drew great numbers of people to frequent them. Silence seems to have been a particular requisite in these retreats, as appears by this inscription, *Nymphis loci, bibe, lava, tace*. The building between Naples and Vesuvius, mentioned above, was certainly one of these *nymphæa*.

NYSA, or NYSSA, in *Ancient Geography*, a town of Ethiopia, to the south of Egypt. Some place it in Arabia. This city, with another of the same name in India, was sacred to the god Bacchus, who was supposed to have been educated there by the nymphs of the place, and who received the name of *Dionysus*, which seems to be compounded of *Διος* and *Νύσα*, the name of his father, and that of the place of his education. The god is believed to have made this place the seat of his empire, and the capital of the conquered nations of the East. According to some geographers, there were no less than ten places of this name.

Nymph
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Nysa.

O.

O A K

O A K

O
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Oak.

O, THE fourteenth letter and fourth vowel of our alphabet, being pronounced as in the words *nose*, *rose*, *hose*. The sound of this letter is often so soft as to require it double, and that chiefly in the middle of words, as *goose*, *reproof*, *woof*; and in some words this double *oo* is pronounced like *u* short, as in *blood*, *flood*. As a numeral, O was sometimes used for 11 amongst the ancients, and with a dash over it, thus, $\bar{O}$, it stood for 11,000. In the notes of the ancients, O. CON. is read *opus conductum*; O. C. Q. *opera consilioque*; O. D. M. *operæ donum munus*; and O. L. O. *opus locatum*. The Greeks had two O's, namely, the omikron, $\omicron$, and the omega, ω ; the one being pronounced on the tip of the lips with a sharper sound, and the other in the middle of the mouth, with a fuller sound, equal to *oo* in our language. The long and short pronunciations of our O are equivalent to the two Greek ones. O is usually denoted as long by a servile *a* subjoined, as *moan*; or by *e* at the end of the syllable, as *bone*; but when these vowels are not used it is generally short. Amongst the Irish, the letter O, at the beginning of the name of a family, is a character of dignity annexed to great houses. Thus, in the history of Ireland, we frequently meet with the *O'Neals*, *O'Carrolls*, and *O'Connells*, considerable personages in that island. Indeed Campden observes, that it is the custom of the lords of Ireland to prefix an O to their names, to distinguish them from the commonalty. The ancients used O as a mark of triple time, from a notion that the ternary, or number 3, was the most perfect of numbers, and therefore properly expressed by a circle, which is the most perfect of figures. It is not, strictly speaking, the letter O, but the figure of a circle $\bigcirc$, or double $\bigcirc\bigcirc$, by which the early moderns used to express in music what they called *tempo perfecto*, or triple time; and hence the Italians call it *circolo*. The seven antiphones, or alternate hymns of seven verses, sung by the choir in the time of Advent, were formerly called O, from their beginning with such an exclamation.

O, or OH, is an adverb of calling, or interjection of sorrow or wishing.

OAK. The oak has long been known by the title of "monarch of the woods," and, we may add, justly.

The ancient Druids had a profound veneration for oak trees. Pliny says that "the Druids, as the Gauls call their magicians or wise men, held nothing so sacred as the mistletoe, and the tree on which it grows, provided it be an oak. They make choice of oak groves in preference to all others, and perform no rites without oak leaves; so that they seem to have the name of Druids from thence, if we derive their name from the Greek."

This useful tree grows to such surprising magnitude, that were there not many well-authenticated instances in our own country, it would certainly appear difficult to believe that it could attain such size. In the eighteenth volume of the Gentleman's Magazine we have the dimensions of a leaf twelve inches in length and seven in breadth; and all the leaves of the same tree were equally large. On the estate of Woodhall, purchased in 1775 by Sir Thomas Rumbold, an oak was felled which sold for L.43, and measured twenty-four feet in circumference. We are also told of one in Millwood Forest, near Chaddesley, which was in full verdure in winter, getting its leaves again, after the autumnal ones fell off. In Evelyn's *Sylva*, we have an account of a very remarkable

oak at Greendale, which Gough, in his edition of Campden, thus minutely describes: "The Greendale oak, with a road cut through it, still bears one green branch. Such branches as have been cut or broken off are guarded from wet by lead. The diameter of this tree at the top, whence the branches issue, is fourteen feet two inches; at the surface of the ground eleven feet and a half, circumference there thirty-five feet; height of the trunk fifty-three; height of the arch ten, width six. Mr Evelyn mentions several more oaks of extraordinary size in Worksop Park."

M. Hamel du Monceau, a member of the Royal Academy of Sciences at Paris, gave an account, in the year 1749, of an oak which he had kept in water eight years, and which yielded fine leaves every spring. The tree, he says, had four or five branches; the largest nineteen or twenty lines round, and more than eighteen inches in length. It throve more in the first two years than it would have done in the best earth; but it afterwards lost its vigour, and rather decayed, which he attributed more to a defect in the roots than to a want of aliment.

Buffon made some experiments upon oak trees, the result of which is recorded in the Gentleman's Magazine, 1754. He had compared barked with unbarked trees, and concluded, from a variety of trials, that timber barked and dried standing, is always heavier and considerably stronger than timber kept in its bark.

The use of oak bark in tanning, and in hot-beds, is generally known. For the latter of these purposes, however, oak leaves are now found to answer equally well, or rather better. In the notes to Dr Hunter's edition of Evelyn's Treatise on Forest Trees, we find certain directions for their use, by Mr Speechly. The leaves are to be raked up as soon as possible after they fall from the trees. When raked into heaps, they should immediately be carried into some place near the hot-houses, where they may lie to couch. It is the custom of some to fence them round with charcoal hurdles, or any thing to keep them from being blown about the garden in windy weather. They are then trodden well, and watered in case they happen to have been brought in dry. The heap is made six or seven feet thick, and covered over with old mats, or any thing else, to prevent the upper leaves from being blown away. In a few days the heap will attain a strong heat. For the first year or two in which he used these leaves, Mr Speechly did not continue them in the heap longer than ten days or a fortnight; but by this method of management they settle so much when brought to the hot-house, that a supply was very soon required; and he afterwards found, that it was proper to let them remain five or six weeks in the heaps before they were brought to the hot-house. In getting them into the pine pots, if they appear dry, they are to be watered, and again trodden down exceedingly well, in layers, till the pits are quite full. The whole is then covered with tan bark, to the thickness of two inches, and well trodden down, till the surface becomes smooth and even. The pine pots are then to be placed in the manner in which they are to stand, beginning with the middle row first, and filling up the spaces between the pots with tan. In this manner we are to proceed to the next row, till the whole be finished; and the operation is performed in the same manner as when tan only is used. The leaves require no further trouble through the whole season, as they will retain a constant and regu-

Oak.

Oaka
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Oakham-
ton.

lar heat during twelve months without stirring or turning; and Mr Speechly informs us, that if he might judge from their appearances when taken out, being always entire and perfect, it was probable they would continue their heat through a second year; but, as an annual supply of leaves is easily obtained, the experiment is hardly worth making. After this, the pines will have no occasion to be moved except at stated times of their management, as at the shifting them in their pots, when at each time a little fresh tan should be added to make up the deficiency arising from the settling of the beds; but this will be inconsiderable, as the leaves do not settle much after their long couching. During the first two years of our author's practice he did not use any tan, but plunged the pine pots into the leaves, and merely covered the surface of the beds, when finished, with a little saw-dust, to give it a neatness. This method, however, was attended with one inconvenience; for, by the caking of the leaves, they shrunk from the sides of the pots, by which they became exposed to the air, and at the same time the heat of the beds was permitted to escape. See PLANTING.

OAK-Leaf Galls. These are of several kinds. The remarkable species called the *mushroom gall* is never found on any other vegetable substance than these leaves; and, besides this, there is a great number of other kinds.

The double gall of these leaves is very singular, because the generality of productions of this kind affect only one side of a leaf or branch, and grow all one way; whereas this kind of gall extends itself both ways, and is seen upon each side of the leaf, in the form of two protuberances, the one opposite to the other. These are of differently irregular shapes; but their natural figure seems that of two cones, with broad bases and very obtuse points, though they are sometimes round, or very nearly so.

These make their first appearance on the leaf in April, and remain on it till June, or even longer. They are at first green, but afterwards yellowish, and are softer to the touch than many other of the productions of this kind. They are usually about the size of a large pea, but sometimes they grow to the size of a nut. When opened, they are found to be of that kind which is inhabited each by one insect only, and contains but one cavity. The cavity in this, however, is larger than in any other gall of the size, or even in many others of three times its size; the sides of it being very little thicker than the substance of the leaf.

OAKA, a town of Hindustan, in the province of Gujerat, and capital of a district of the same name. It was long the residence of a gang of pirates, who preyed upon the trade and shipping that frequented those seas. They at length received a severe chastisement from the East India Company's marine, and afterwards agreed to respect the British flag. These rude people were accustomed to rely for protection in their piratical adventures upon an idol at the temple of Dwaraca, to which they vowed a large share of the plunder provided they were successful; and they were accordingly instigated to piracy by the priests of the temple, who were large sharers in the booty acquired. The district of Oaka or Oakamundal is situated on the Gulf of Cutch, and separated from the mainland by the swamp called the Runn. The few quiet inhabitants who reside in it breed a number of camels, which browse on the shrubs growing around the swamp; but the greater number of the people are pirates. Long. of the town 69. 36. E. Lat. 22. 14. N.

OAKHAMPTON, a borough and market town in the county of Devon, and hundred of Lifton, 195 miles from London, and twenty-one from Exeter. There is very little trade in this place, the manufacture of serges having of late years disappeared. The corporation consisted of a mayor, burgesses, a recorder, and eight aldermen. It re-

turned two members to parliament till 1832, but it is now disfranchised. The population amounted in 1801 to 1430, in 1811 to 1440, in 1821 to 1907, and in 1831 to 2055.

OAKINGHAM, or **WOKINGHAM**, a market-town of the hundred of Sonning, in the county of Berks, but with the singularity, that a part of the town, including the church, is in the hundred of Amesbury, and the county of Wilts. It is thirty-two miles from London, and seven from Reading, and is situated on the border, within the boundary of the royal forest of Windsor. It consists of four streets meeting in the market-place, where is the town-hall. The church is an extensive structure, supported by handsome pillars, and adorned by many monuments. It has a good free school, and some charities, particularly one endowed by Archbishop Laud for female servants. A well-furnished market is held every Tuesday. The number of inhabitants, including the parts of both counties, amounted in 1801 to 2027, in 1811 to 2085, in 1821 to 2490, and in 1831 to 2692.

OANNES, a being in Chaldaic mythology, represented as half a man and half a fish. According to Berosus and other fabulous writers, this monster was the civilizer of the Chaldæans, to whom he is said to have taught a system of jurisprudence so perfect as to be incapable of further improvement. In discharging the duties of his office, he is said to have spent the day on dry land, but to have retired every night into the ocean or the river.

OAR, a long piece of timber, flat at one end and round or square at the other, and which being applied to the side of a floating vessel, serves to propel, or cause it to advance upon the water.

That part of the oar which is out of the vessel, and which enters into the water, is called the *blade* or *wash-plat*; and that which is within board is termed the *loom*, the extremity of which, being small enough to be grasped by the rowers or persons managing the oars, is called the *handle*.

OARISTUS, or **OARISTYS**, a term in Greek poetry, signifying a dialogue between a husband and his wife; as that in the sixth book of the Iliad, between Hector and Andromache. Scaliger observes, that the oaristus is not properly any particular little poem, or entire piece of poetry, but always a part of a great one; and that the passage in Homer here referred to is the only proper oaristus extant in ancient poetry.

OASIS, the name of a fertile spot in the midst of a sandy desert. Many of these spots, or *oases*, in the African deserts, are remarkable for their fertility.

OATH, an affirmation or promise, accompanied with an invocation of God to witness what we say, and with an imprecation of his vengeance, or a renunciation of his grace, if what we affirm be false, or what we promise be not performed. The word is a corruption of the Saxon *eoth*; and in England it is often called a *corporal oath*, because, in the days of Catholicism, the person was sworn upon the host or *corpus Christi*.

The laws of all civilized states have required the security of an oath for evidence given in a court of justice, and on other occasions of high importance; but the Quakers and some other sects refuse to swear on any occasion, even at the requisition of a magistrate, and in a court of justice. The text of Scripture upon which the Quakers principally rest their argument for the unlawfulness of all swearing, is our Saviour's prohibition, "I say unto you, swear not at all." But it is only in ordinary conversation, and by no means in courts of justice, that Christ prohibits his followers from swearing at all. There is no evidence whatever, that swearing by heaven, by the earth, by Jerusalem, or by their own heads, was the form of a judicial oath in use amongst the Jews. On the contrary, we are told by Maimonides, that "if any man swear by heaven or

Oaking-
ham
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Oatli.

Oath.

by earth, yet this is not an oath ;" which, surely, he could not have said had such been the forms of judicial swearing. Indeed the Jews could not have admitted such forms into their courts without expressly violating the law of Moses, who commands them to " Fear Jehovah their God, to serve him, and to swear by his name." But the Jews, as every one knows, had such a reverence for the name of Jehovah, that they would not pronounce it on slight occasions, and therefore could not swear by that name in common conversation. Hence, to gratify their propensity to common swearing, they invented such oaths as, by heaven, by earth, by Jerusalem, by the life of thy head, and such like, and by this contrivance they thought to avoid the guilt of profaning the name of Jehovah. These, however, being appeals to insensible objects, either had no meaning, or were in fact, as our Saviour justly argues, oaths by that God whose creatures they were ; so that the Jew who swore them was still guilty of profaneness towards the very Jehovah whose name his superstition would not permit him to pronounce. But what puts it beyond all doubt that the use of judicial oaths is not wholly prohibited in the gospel, is the conduct of our Saviour himself, as well as that of his apostle St Paul. When Jesus was simply asked by the high priests, what it was which certain false witnesses testified against him, we are told by the evangelists, that " he held his peace ;" but being adjured by the living God to declare whether he was the Christ, the Son of God, or not, he immediately answered the high priest, without objecting to the oath (for such it was) upon which he was examined. St Paul, in his Epistle to the Romans, says, "*God is my witness*, that, without ceasing, I make mention of you in my prayers ;" and to the Corinthians, still more strongly, "*I call God for a record upon my soul*, that, to spare you, I came not as yet to Corinth." Both these expressions are of the nature of oaths ; and the author of the Epistle to the Hebrews speaks of the custom of swearing judicially without any mark of censure or disapprobation : " Men verily swear by the greater ; and an oath, for confirmation, is to them an end of all strife."

But although a nation has an undoubted right to require the security of an oath upon occasions of real importance, it is something worse than bad policy to multiply oaths, and to hold out to the people temptations to perjure themselves. The security which an oath affords depends entirely upon the reverence which attaches to it in the mind of him by whom it is given ; but that reverence is much weakened by the frequency of oaths, and by the careless manner in which they are too often administered. Paley observes, with truth, that " the levity and frequency with which oaths are administered, has brought about a general inadvertency to the obligation of them, which, both in a religious and political view, is much to be lamented ; and it merits," continues he, " public consideration, whether the requiring of oaths on so many frivolous occasions, especially in the customs, and in the qualification for petty offices, has any other effect than to make them cheap in the minds of the people. A pound of tea cannot travel regularly from the ship to the consumer without costing half a dozen oaths at least ; and the same security for the due discharge of his office, namely, that of an oath, is required from a churchwarden and an archbishop, from a petty constable and the chief justice of England. Let the law continue its own sanctions if they be thought requisite, but let it spare the solemnity of an oath ; and where it is necessary, from the want of something better to depend upon, to accept a man's own word or own account, let it annex to prevarication penalties proportioned to the public consequence of the offence."

Besides the frequency of oaths, we have mentioned the irreverent manner in which they are too often administered as one of the causes which make them cheap in the esti-

mation of the people. In this view, the form of the oath, and the ceremonies with which it is required to be taken, are of considerable importance. " The forms of oaths in Christian countries," says Paley, " are very different ; but in none, I believe, worse contrived, either to convey the meaning or to impress the obligation of an oath, than in England."

Oaths are either assertory or promissory. Assertory oaths are required both to confirm our veracity in evidence, and to give security to the public, that we believe certain propositions conceived to be of public importance. An oath in evidence binds the juror to declare what he knows to be true, and nothing but what he knows to be true. An oath required to assure the public of our belief in the truth of any proposition cannot, without the guilt of perjury, be taken by any man, who, at the time of swearing, has the slightest doubt in his mind whether the proposition be really true. Such an oath, however, though it unquestionably requires the sincerity of the juror's belief at the time when it is given, cannot oblige him to continue in that belief as long as he may live ; for belief is not in any man's power, being the necessary consequence of evidence, which compels the assent of the mind, according as it appears to preponderate on the one side or on the other. No man, therefore, can be justly accused of perjury for holding opinions contrary to those which he may formerly have sworn to believe ; because his belief at the time of emitting his oath may have been the necessary result of the evidence which then appeared before him, and his change of opinion may have resulted with the same necessity from superior evidence which had been since then thrown into the opposite scale, and made it preponderate. On this account we cannot help thinking that all assertory oaths, excepting such as are necessary to confirm testimony respecting facts, ought either to be abolished, or expressed with great caution. Of truths intuitively certain, or capable of rigid demonstration, no man of common sense can entertain a doubt ; and therefore the public never requires from individuals the solemnity of an oath as an assurance of their believing such truths. But with respect to the truth of propositions which admit of nothing superior to moral evidence upon either side, a man of the most steady virtue may think differently at different periods of his life ; and in such cases, the effect of an oath, if it have any effect, can only be either to shut the man's eyes against the light, or to make his integrity be causelessly questioned by those who may observe his change of belief.

Promissory oaths cannot, without the guilt of perjury, be given by him who, at the time of swearing, knows that it will not be in his power to fulfil the promise, or who does not seriously intend to fulfil it. A promissory oath cannot, without great guilt, be given by any man, who at the time of swearing believes the object of the promise to be in itself unlawful ; for if he seriously mean to fulfil his oath, he calls upon Almighty God to witness his intention to commit a crime. Promissory oaths give to the public greater security than a simple promise ; because the juror having the thoughts of God and of religion more upon his mind at the one time than at the other, offends with a higher hand, and in more open contempt of the divine power, knowledge, and justice, when he violates an oath, than when he breaks a simple promise. Yet it is certain that promissory oaths, though more solemn and sacred, cannot be binding when the promise without an oath would not be so, though in an inferior degree.

OAXACA, one of the states of the republican confederacy of Mexico. See the article MEXICO.

OAXACA, the capital city of a state of the same name in the republic of Mexico. It is built on the site of the ancient Huaxyacac, and bore the name of Antequera at the time of the conquest. Its situation is in a delightful valley, forty miles in length by twenty in breadth, and it lies

Oath
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Oaxaca.

Oba
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Oban.

230 miles south of the city of Mexico. Oaxaca is built in the form of an oblong square, being nearly two miles by one and a quarter in extent, including the suburbs, which are principally occupied by gardens. It is one of the neatest, cleanest, and most regularly built towns in Mexico. The streets are wide and well paved; and there are a number of squares, the beauty of which is enhanced by the presence in all of them of handsome public fountains. The edifices are constructed of a green stone, which, preserving its colour to perpetuity, gives the city a singular appearance of freshness. The convent of San Francisco, situated in the great square, was erected above two hundred years ago, yet it still retains the appearance of a new building. There are a number of public edifices in Oaxaca, including several churches, which are solidly built, and richly decorated. The climate is considered as unsurpassed for salubrity and equability by any in the republic, the thermometer rarely falling below 63°, nor ranging higher than 78°. The markets are supplied with fruits both of the temperate and torrid zones, raised in the vicinity; and it is no uncommon thing to see trees loaded with oranges on one side of the road, and fields of wheat extending on the other. Oaxaca was formerly more populous than it is at present, having suffered a good deal during the revolutionary struggle; but the inhabitants still amount to about 20,000.

OBA, a town of Persia, in the province of Azerbaijan, at the head of a small gulf on the western coast of the Caspian, and on one of the mouths of the Kur, about 150 miles north-east of Tabreez.

OBADIAH, or the *Prophecy* of OBADIAH, a canonical book of the Old Testament, contained in a single chapter. It is partly an invective against the cruelty of the Edomites, who mocked and derided the children of Israel as they passed into captivity, and, with their confederates, invaded and oppressed these strangers, dividing the spoil amongst themselves; and partly a prediction of the deliverance of Israel, and of the victory and triumph which the church would gain over her enemies.

OBAN, a neat and small modern town in the parish of Kilbride, lordship of Lorn, and county of Argyle, ninety-two miles from Glasgow, and 136 from Edinburgh. The situation of the town is well chosen, both as regards the picturesque scenery amidst which it is placed, the convenient station which its bay affords for national purposes, as the dépôt for the trade of the Hebrides and the western coast of the Highlands, and as being admirably designed for a fishing station. The bay of Oban, at the head of which the town lies, is semicircular, being formed by the island of Kerrera in front, and, backed by the huge ranges of the Argyleshire mountains; it is well sheltered from the western winds by the island of Kerrera, varies from twelve to twenty-four fathoms in depth, and is capable of containing from three to five hundred sail of merchantmen. The steamers from Glasgow and Liverpool, which visit the western coast and Inverness by the Crinan and Caledonian Canals, generally stop at Oban; and, from the salubrity of the air, and moderate rate of the markets, it is much resorted to as bathing quarters during the summer months, and many respectable families have now made it their permanent place of residence. The territory of the burgh consists of the lands of Oban and Glenshellich, with the ferry-house, miller's croft, and loch, and the lands of Glencrutten. This territory, however, extends considerably beyond the parliamentary bounds assigned to the town by the burgh reform act. The town is divided by a small river into two divisions, called the eastern and western. In the eastern a handsome church was erected in the year 1821 as a chapel of ease to the parish church, which is at a distance of four miles from the town. It was constituted a port of customs in the year 1763; and the custom-house is pleasantly

placed upon a rising situation, so as to command a view of the bay. The superiors and proprietors of the burgh are the Duke of Argyll and Mr Campbell of Combie. These proprietors and their predecessors, as soon as they observed that some trade had begun to be carried on, granted building leases of portions of their lands upon the most liberal terms, and under this system it rapidly increased. Oban was first erected into a burgh of barony in 1811 by the Duke of Argyll, with the consent of Mr Campbell. This charter was, however, laid aside, on grounds arising out of the titles of the Argyll estates; and Mr Campbell having in the mean time acquired the superiority of his lands, a new charter was granted in the year 1820. There are no public buildings belonging to the burgh, nor public institutions of any kind; neither is it possessed of any property or annual revenue, nor encumbered with any amount of debt. The magistrates and council have no power to tax or assess the inhabitants, and no taxes have been imposed; neither have they the right of appointment to any office, civil or ecclesiastical. The exports to Glasgow and Liverpool are cattle, wool, fish, pig iron, and slates brought from the district of Easdale. A weekly market is held in the town, and two annual fairs. The municipal government of the burgh is vested in two bailies and four councillors; and by its charter the burgesses annually elect a dean of guild, a nominal treasurer, and the different officers connected with a burgh court. The burgh returns, with Ayr, Irvine, Campbellton, and Inverary, a member to parliament. The population of Oban amounted in 1831 to 1480.

OBDORSK, a name which is given to that part of Asiatic Russia which extends along the northern part of the course of the Obi to the Frozen Ocean. It is also the name of a small palisaded fort, the most northerly of any maintained by Russia, being garrisoned by an officer, with twenty-five Cossacks, who exercise a species of sovereign control over the scattered tribes of Ostiaks and Samoyedes.

OBELISK, in *Architecture*, a truncated, quadrangular, and slender pyramid, raised as an ornament, and frequently charged with inscriptions or hieroglyphics.

Obelisks appear to have been of very great antiquity, and first raised to transmit to posterity certain precepts, which were cut in hieroglyphical characters; but they were afterwards used to immortalize the great actions of heroes, and the memory of persons who were beloved. The first obelisk mentioned in history was that of Ramesses king of Egypt, which was forty cubits high. Phius, another king of Egypt, raised one of fifty-five cubits; and Ptolemy Philadelphus, another of eighty-eight cubits, in memory of Arsinoë. Augustus erected one at Rome in the Campus Martius, which served to mark the hours on a horizontal dial, drawn upon the pavement. They were called by the Egyptian priests the "fingers of the sun," because they were made in Egypt to serve also as styles or gnomons for marking the hours on the ground. The Arabs still call them "Pharaoh's needles." All the learning on the subject of obelisks will be found accumulated in the elaborate work of Zoëga (*De Origine et Usu Obeliscorum*) printed at Rome, and illustrated with very beautiful and accurate plates, in which the hieroglyphics are represented with great distinctness and accuracy.

OBERGLEICHEN, a city of the grand duchy of Saxe-Gotha, in Germany, in the circle of Volkerode, the capital of a bailiwick of the same name. It is situated on the river Ohre, in the Thuringen Forest, and is the property of Prince Hohenlohe of Neuenstein, now mediatized. It contains four churches, two hospitals, 860 houses, and 3640 inhabitants, who carry on various manufactures, especially those of woollen, iron, and copper. Lat. 50. 50. 33. N.

OBERNAY, or OBEREHINHEIM, a town of the department of the Lower Rhine, and the arrondissement of Schlet-

Obdorsk
||
Obernay.

Oberniki
||
Oblati.

stadt, in France. It stands on the river Ergers, upon the side of the mountain Odilienberg, and contains 1559 inhabitants, who carry on a great trade as coppersmiths and bell-founders.

OBERNIK, a town of the Prussian government of Posen, the capital of a circle of the same name, which contains four towns and 109 villages, with 32,200 inhabitants. It stands on the river Warthe, at its junction with the Welna, and contains 1200 inhabitants, of whom more than one third are Jews. It has some linen weaving.

OBERZO, a city of Austrian Italy, in the province of Milan and delegation of Treviso. It was the *Opitergum* of Strabo, and formerly stood on the sea, but is now some miles from it. It is fortified, and contains 730 houses, with 4560 inhabitants. Long. 12. 24. 49. E. Lat. 45. 46. 23. N.

OBI, a great river of Asiatic Russia, which is said to rise in fifty-two degrees of north latitude, on the southern side of the Altai Mountains, from a lake called by the Tartars Altyn Noor. It is now denominated By, and was formerly known by the name of the Great River, as being the longest which flows through Asiatic Russia. It receives the waters of the Irtysch, after which it becomes very broad, and sometimes extends several miles across. It also spreads out into branches, which again re-unite and form numerous islands. It flows through the governments of Kolivan, Tobolsk, Tomsk, and Narym. The entire length of its stream is two thousand miles; yet, from the northerly course which it takes into the barren and inhospitable regions of Northern Asia, it is comparatively of much less benefit in facilitating the internal communications of the country than if it flowed east and west, as it only gives access to countries cold, unproductive, and barbarous, which mankind would rather desire to fly from than to visit. It abounds, however, in fish, which might become a lucrative object of trade, as during the summer season they might be sent along the Northern Ocean to Archangel.

OBIDOS, a town of Portugal, in the province of Estremadura, and the corregimento of Alenquer. It is situated near the sea coast, on an inlet which forms a small lake called the Lago de Obidos, and contains 1090 houses, but not much more than 3500 inhabitants. On a hill adjoining are the ruins of an ancient castle. A battle was fought at this place by a part of the Duke of Wellington's army, previous to the conflict of Vimiera, in August 1808. It is about forty-five miles north of Lisbon.

OBJECT, in *Philosophy*, is something apprehended or presented to the mind by sensation or imagination. See METAPHYSICS.

OBJECTIVE, is a term used in the schools, in speaking of a thing which exists no otherwise than as an object known. The existence of such a thing is said to be objective.

OBIT signifies a funeral solemnity, or office for the dead, most commonly performed when the corpse lies in the church uninterred; and also the anniversary office. The anniversary of any person's death was called the *obit*; and to observe such day with prayers and alms, or other commemoration, was the keeping of the obit. In religious houses they had a register, in which they entered the obits or obitual days of their founders and benefactors, and which was thence termed the *obituary*. The tenure of obit or chantry lands was taken away and extinguished by 1 Edw. VI. c. 14, and 15 Car. II. c. 9.

OBLATE, flattened or shortened, as an oblate spheroid, having its axis shorter than its middle diameter, and being formed by the rotation of an ellipse about its shorter axis. The earth, the polar diameter of which is shorter than the equatorial, is an oblate spheroid.

OBLATI, in church history, were secular persons, who

devoted themselves and their estates to some monastery, into which they were admitted as a kind of lay-brothers. The form of their admission was putting the bell-ropes of the church round their necks, as a mark of servitude. They wore a religious habit, which, however, was different from that of the monks.

OBLIGATION, in general, denotes any act by which a person becomes bound to another to do something, as to pay a sum of money, be surety, or the like. Obligations are of three kinds; natural, civil, and mixed. Natural obligations are entirely founded on natural equity; civil obligations rest on civil authority alone, without any necessary foundation in natural equity; and mixed obligations are those which, being founded on natural equity, are besides enforced by civil authority.

In a legal sense, obligation signifies a bond, in which is contained a penalty, with a condition annexed, for the payment of money, or the performance of some act. The difference between it and a bill is, that the latter is generally without a penalty or condition, though it may be made obligatory; and obligations are sometimes incurred by matter of record, as statutes and recognizances.

OBLIQUE, in *Geometry*, something aslant, or which deviates from the perpendicular. Thus an oblique angle is either an acute or obtuse one, that is, any angle except a right one.

OBLIQUE Cases, in *Grammar*, are all the cases of nouns except the nominative.

OBLIQUE *Ascension* is that point of the equinoctial which rises with the centre of the sun, or star, or any other point of the heavens, in an oblique sphere.

OBLIQUE *Circle*, in the stereographic projection, is any circle which is oblique to the plane of projection.

OBLIQUE *Descension*, that point of the equinoctial which sets with the centre of the sun, or star, or any other point of the heavens, in an oblique sphere.

OBLIQUE *Line*, that which, falling on another line, makes oblique angles with it; that is, the one acute, and the other obtuse.

OBLIQUE *Planes*, in *Dialling*, are those which decline from the zenith, or incline towards the horizon.

OBLIQUE *Sailing*, in *Navigation*, is when a ship sails upon some rhumb between the four cardinal points, making an oblique angle with the meridian; in which case she continually changes both latitude and longitude.

OBLIQUUS, in *Anatomy*, a name given to several muscles, particularly in the head, eyes, and abdomen.

OBLONG, in general, denotes a figure the length of which exceeds the breadth; as, for example, a parallelogram.

OBOLUS, an ancient silver money of Athens, the sixth part of a drachma, and worth somewhat more than a penny farthing sterling.

OBOLUS, in *Medicine*, is used to signify a weight of ten grains, or half a scruple.

OBOJAN, a city of Russia, in the government of Kursk, the capital of a circle of the same name. It stands at the mouth of the Obojanta, where that river falls into the Psol, and contains 430 dwelling-houses, with 5500 inhabitants, all trading in the products of the vicinity. It is 756 miles from St Petersburg. Long. 35. 45. E. Lat. 51. 12. N.

OBREPTITIOUS, an appellation given to letters patent, or other instruments, obtained of a superior by surprise, or by concealing from him the truth.

OBSCAIA, a gulf of the Frozen Ocean, on the southern coast of Asiatic Russia, and forming the estuary of the great river Obi. It extends from lat. 66. 40. to 72. 15. N. and from long. 72. to 76. E.

OBSCURE, something that is dark, and reflects little light on material objects, or that is not clear and intelligible in the objects of the intellect.

Obligation
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Obscure.

Obse-
cra-
tion
||
Occult.

OBSECRATION, in *Rhetoric*, a figure by which the orator implores the assistance of God or man.

OBSERVATION ISLAND, a small island on the north coast of New Holland, in the Gulf of Carpentaria, on the west shore, and one of Sir Edward Pellew's group.

OBSERVATORY, a place destined for observing the heavenly bodies, being generally a building erected upon some eminence, covered with a terrace for making astronomical observations. There are many such buildings; but the more celebrated are, the Greenwich observatory, built in 1676, by order of Charles II. at the solicitation of Sir Jonas Moore and Sir Christopher Wren, and furnished with accurate instruments; the Paris observatory, built by the order of Louis XIV. in the fauxbourg St Jacques; and Tycho Brahe's observatory, which was situated in the little island of Ween, between the coasts of Schonen and Zealand, in the Baltic. This last was erected and furnished with instruments at the expense of Tycho, and called by him Uraniburg. Here he spent twenty years in observing the stars, the result of which was his catalogue. Pekin observatory Le Compte describes as a magnificent establishment, having been erected and furnished at the intercession of some Jesuit missionaries, principally Verbeist. Of the observatory at Benares, Sir Robert Barker gives a very full account in the Philosophical Transactions (vol. lxvii. p. 598).

OBSERVATORY ISLAND, or PADEVOUA, a small island in the South Pacific Ocean, near the north-east coast of New Caledonia. Long. 165. 41. E. Lat. 20. 18. S.

OBSIDIONALIS, an epithet applied by the Romans to a sort of crown, conferred on those who had distinguished themselves in the attack of fortified places.

OBY, or OUBY, a small island in the Eastern Seas, fifty miles long, and from twelve to twenty broad. The sovereignty of this island is claimed by the sultan of Bachian, who has a pearl fishery on its coasts. On this island live many runaway slaves, who cultivate cloves, which they sell to the Buggesses. The Dutch have a small fort on the western side of the island. Long. 124. 56. E. Lat. 1. 36. S. Little Oby is a small island near the west coast of the above island. Long. 127. 12. E. Lat. 1. 26. S.

OCANA, a town of Spain, in the province of Toledo, the capital of a partida of the same name, about thirty miles to the south-east of Madrid. It stands on a fertile plain, and is surrounded with an ancient and now a dilapidated wall, the buildings bearing more marks of antiquity than of beauty. It has four churches and eleven religious houses, and is adorned with two fountains, one of them of great beauty. The actual population does not much exceed 5000 persons, and the only occupations, besides that of cultivating the surrounding land, consist in making soap, tanning leather, and making a few silk goods. This place has been rendered remarkable by the great battle fought there in November 1809, when the Spanish army of 50,000 was defeated and dispersed by a French force of considerably less than half that number.

OCCIDENT, in *Geography*, the westward quarter of the horizon, or that part of the horizon where the ecliptic, or the sun therein, descends into the lower hemisphere. It is used in contradistinction to *orient*. Hence the word *occidental* signifies any thing belonging to the west; as occidental bezoar, occidental pearl, and the like.

OCCIDENT *Estival*, that point of the horizon where the sun sets at midwinter, when entering the sign Capricorn.

OCCIDENT *Equinoctial*, that point of the horizon where the sun sets when he crosses the equinoctial, or enters the sign of Aries or of Libra.

OCCIPITAL, in *Anatomy*, a term applied to the parts of the occiput, or posterior part of the skull.

OCCULT, something hidden, secret, or invisible. The occult sciences are magic, necromancy, and some others. Occult qualities, in philosophy, were those qualities of bo-

Occult
||
Ochrida.

dy or spirit which baffled the investigation of philosophers, and for which they were unable to give any reason. Unwilling, however, to acknowledge their ignorance, they deceived themselves and the vulgar by an empty title, calling what they did not know *occult*.

OCCULT, in *Geometry*, is used to signify a line that is scarcely perceptible, drawn with the point of the compasses or a leaden pencil. These lines are used in several operations, as the raising of plans, designs of building, and pieces of perspective; and they are to be effaced when the work is finished.

OCCULTATION, in *Astronomy*, the time during which a star or planet is hid from our sight, by the interposition of the body of the moon or some other planet.

OCCUPANCY, in *Law*, is the taking possession of those things which before belonged to nobody. This, according to Blackstone, is the true ground and foundation of all property, or of holding those things in severalty, which by the law of nature, unqualified by that of society, were common to all mankind.

OCEAN, the vast mass of salt water which encompasses all parts of the globe, and by means of which, in the present improved state of navigation, an easy intercourse subsists between places the most distant. The ocean is distinguished into three grand divisions; the Atlantic Ocean, which divides Europe and Africa from America, and is generally about three thousand miles wide; the Pacific Ocean, or South Sea, which divides America from Asia, and is generally about ten thousand miles over; and the Indian Ocean, which separates the East Indies from Africa, and is three thousand miles across. The other seas which are called *oceans* are only parts or branches of these, and usually receive their names from the countries which they border on. See PHYSICAL GEOGRAPHY.

OCEANIDES, in fabulous history, sea-nymphs, daughters of Oceanus, from whom they received their names, and of the goddess Tethys or Thetis.

OCEANUS, in pagan mythology, the son of Cœlus and Terra, the husband of Thetis, and the father of the rivers and fountains. The ancients called him the "father of all things," imagining that he was produced by Humidity, which, according to Thales, was the first principle whence every thing was produced. Homer describes Juno as visiting him at the remotest limits of the earth, and acknowledging him and Thetis as the parents of the gods. He was represented with a bull's head, as an emblem of the rage and bellowing of the ocean when agitated by storms or tempests.

OCELLUS the LUCANIAN, an ancient Greek philosopher of the school of Pythagoras, who lived before Plato. His work *περί του Παντος*, or the Universe, is the only production of his which has come down entire to us; it was written originally in the Doric dialect, but has been translated by another hand into the Attic. William Christian, and after him Louis Nogarola, translated this work into Latin; and there are several editions of it, both in Greek and in Latin.

OCHLOCRACY, that form of government in which the populace have the chief administration of affairs.

OCHRIDA, a town of Greece, in the province of Albania, the capital of a district of the same name, which it has derived from a lake near it, known to the ancients as the Lychnidus. It is situated on the declivity of Mount Maniana Petrin, on the great road formerly leading from Pella to Dyracchium; and near to it runs the river Drino. The inhabitants are descended from a Bulgarian colony, and they adhere to the Greek church, of which religion there is an archbishop in this place. In the vicinity there are mines of sulphur and of silver, the working of which forms the chief occupation of the population, which amounts to about 4500 persons.

Ochus
||
Octagon.

OCHUS, a king of Persia, and son of Artaxerxes. He was cruel and avaricious, and, in order to strengthen himself on his throne, murdered all his brothers and sisters. His subjects revolted; but he reduced them to obedience, and added Egypt to his other dominions. Bagoas, his favourite eunuch, poisoned him for the insults which he had offered to Apis, the god of the Egyptians, gave his flesh to be eaten by cats, and caused handles for knives to be made with his bones.

OCKLEY, **SIMON**, an eminent orientalist, and professor of Arabic in Cambridge, was born at Exeter in 1678. He was educated at Cambridge, and distinguished himself by uncommon skill in the oriental languages. Having taken a degree in divinity, he was, in 1705, presented by Jesus College with the vicarage of Swavesey, and in 1711 he was chosen Arabic professor of the university. He had a large family, and his latter days were rendered unhappy by pecuniary embarrassments. He died in the year 1720. The principal works of Ockley are, 1. *Introductio ad Linguas Orientales*, a small volume; 2. *The History of the Jews throughout the World, from the Italian of Leo Modena*; 3. *The Improvement of Human Reason, from the Arabic*; 4. *The History of the Saracens*, in 2 vols. 8vo. This last work is justly valued for its accuracy and erudition.

OCKZAKOFF, or **OCZAKOW**, a city, once of great importance and much historical interest, in European Russia, belonging to the government of Cherson. It stood on the Black Sea, and, from its commanding the navigation of the rivers Bug and Dnieper, it was strongly fortified by the Turks, and considered as an important barrier against the advancing progress of the Russians in that portion of their territory. The citadel connected with the town was of prodigious strength, and surrounded with a wall twenty-five feet in height. It was, however, unable to resist the military force with which the Russians attacked it in 1737. The siege was obstinate, but at length it was taken by assault, after a bloody contest, in which the victorious Russians lost more than 18,000 men. In the following year, the Turks, eager to retake the place, advanced with an army of 70,000 men; but they were repulsed with the loss of more than 20,000 of their number. Having accomplished and secured the conquest, the Russians razed the fortifications, and abandoned the spot. The Turks in 1743 constructed once more the works of defence, and maintained a powerful garrison within it till the year 1788, when the Russians again attacked it. The latter, commanded by Suwaroff, besieged it for a long time, and ultimately carried it by storm, with a tremendous loss of life to both armies. By the peace of 1791, the whole district was ceded to Russia, upon which the fortifications were demolished. The establishment of Odessa within thirty miles of Ockzakoff has reduced the place to insignificance; though, from its position on the two navigable rivers, it is favourably situated for commerce, having good anchorage within the bar of the river Bug. Long. 32. 39. 10. E. Lat. 46. 59. 0. N.

OCRA, a viscous vegetable substance well known in the West Indies, where it is used to thicken soup, particularly pepper pot, as well as for other purposes.

OCRISIA, in fabulous history, the wife of Corniculus, and one of the attendants of Tanaquil, the wife of Tarquinius Priscus.

OCTAETERIS, a cycle or term of eight years, in the Grecian chronology, at the conclusion of which three entire lunar months were added. The cycle was in use till Meton's invention of the golden number or cycle of nineteen years.

OCTAGON, or **OCTOGON**, in *Geometry*, is a figure of eight sides and angles. When all the sides and angles are equal, it is called a regular octagon, or one that may be inscribed in a circle.

OCTAHEDRON, or **OCTAEDRON**, in *Geometry*, one of the five regular bodies, consisting of eight equal and equilateral triangles.

OCTANT, the eighth part of a circle.

OCTAPLA, in matters of sacred literature, denotes a Polyglot Bible, consisting of eight columns, and as many different versions of the sacred text.

OCTATEUCH, an appellation given to the first eight books of the Old Testament.

OCTAVE, in *Music*. See **INTERVAL**.

OCTAVIA, the daughter of Caius Octavius, and sister of Augustus Cæsar. She was one of the most illustrious ladies of ancient Rome, being equally conspicuous for virtue and beauty. The death of Marcellus, her son by her first husband Claudius Marcellus, constantly preyed upon her mind, and she died of grief or melancholy, about eleven years before the Christian era. Her brother paid great honours to her memory, and pronounced her funeral oration. The Roman people also showed their respect for her virtues, by wishing to pay her divine honours.

OCTAVIANUS, or **OCTAVIUS CÆSAR**, was the nephew of Julius Cæsar the dictator, being the son of Accia, his sister, by Octavius, a senator; and he afterwards became emperor of Rome. He was born in the year of the city 691, during the consulship of Cicero. His uncle Julius Cæsar adopted him, and left him the greater part of his fortune. When he was about twenty years of age he was raised to the consulship. His youth and inexperience were ridiculed by his enemies; but notwithstanding this obstacle, his prudence and valour soon silenced all objections. He made war against his opponents on pretence of avenging the assassination of his uncle, and engaged in five civil contests with success, namely, the wars of Mutina, Perugia, Philippi, Sicily, and Actium; the first and last of which were against M. Antony; the second against L. Antony, brother of the triumvir; the third against Brutus and Cassius; and the fourth against Sextus Pompey, son of Pompey the Great. He united his forces with those of Antony at the battle of Philippi; and had he not been supported by the activity and bravery of his colleague, he would doubtless have been totally ruined in that engagement. In his triumvirate with Antony and Lepidus, he obtained the western parts of the Roman empire; and, like his other colleagues, the more firmly to establish his power, he proscribed his enemies and cut them off. The triumvirate lasted for ten years. He had given his sister Octavia in marriage to Antony, to render their alliance more lasting; but when Cleopatra had charmed this unfortunate man, Octavia was repudiated. Augustus immediately took up arms to avenge the wrongs of his sister, but perhaps more from a desire to remove a man whose power and consequence kept him in continual fear and constant dependence. Both parties met at Actium to decide the fate of Rome. Antony was supported by all the power of the East, and Augustus by that of Italy. Cleopatra fled from the battle with sixty ships; and her flight ruined the interest of Antony, who followed her into Egypt. The conqueror soon afterwards proceeded to Egypt, where he besieged Alexandria, and honoured with a magnificent funeral his unfortunate colleague and the celebrated queen, whom the fear of being led in the victor's triumph at Rome had driven to commit suicide. After he had established peace all over the world, he shut the gates of the temple of Janus in the year of the city 753. He twice determined to lay down the supreme power, first immediately after the victory obtained over Antony, and again on account of his ill health; but his two faithful friends Mecænas and Agrippa dissuaded him, and contended that if he did he would leave it a prey to the most powerful, and besides expose himself to the greatest dangers. He died at Nola in the seventy-sixth year of his age, after he had held the sovereign power

Octahe-
dron
||
Octavia-
nus.

October
||
Odensee.

during fifty-seven years. He married four times, but he was unhappy in all these connexions; and his only daughter Julia disgraced herself and her father by the debauchery and licentiousness of her manners. At his death he recommended his adopted son Tiberius as his successor. He left his fortune partly to him and to Drusus, and made donations to the army and Roman people. The title of Augustus was conferred upon him by the senate after the battle of Actium and the final destruction of the Roman republic. The title continued afterwards, being given to his successors in the empire. Virgil is said to have written his *Æneid* at the desire of Augustus, whom he represents under the amiable and perfect character of *Æneas*.

OCTOBER, in *Chronology*, the eighth month of Romulus's year, as the name implies; but the tenth in the calendar of Numa, Julius Cæsar, &c. The senate gave this month the name of *Faustinus*, in compliment to Faustina, the wife of the Emperor Antoninus; Commodus wished it to be called *Invictus*; and Domitian named it *Domitianus*; but in spite of all these attempts it still retains its original name. This month was sacred to Mars, and under his protection.

OCTOBER *Equus*, a horse annually sacrificed to Mars in the month of October, either because the horse is a war-like animal, or in order to punish him for the taking of Troy. A race was run with chariots, drawn by two horses, previously to the sacrifices, and he that ran fastest was adjudged to be the victim.

OCTOSTYLE, in the ancient architecture, is the face of an edifice adorned with eight columns.

ODDLY ODD. A number is said to be oddly odd when an odd number measures it by an odd number. Thus 15 is a number oddly odd, because the odd number 3 measures it by the odd number 5.

ODE, in *Poetry*, is a song or composition proper to be sung.

ODENATUS, a celebrated prince of Palmyra, who very early inured himself to bear fatigues, and, by hunting leopards and wild beasts, accustomed himself to the labours of a military life. He was a faithful friend to the Romans; and when Aurelian had been taken prisoner by Sapor king of Persia, Odenatus warmly interested himself in his cause, and solicited his release, by writing to the conqueror, and by sending him presents. The king of Persia was offended at this liberty of Odenatus; he tore the letter, and ordered the presents which were offered to be thrown into a river; and to punish Odenatus, who had the impudence, as he called it, to pay homage to so great a monarch as himself, he commanded him to appear before him, on pain of being devoted to instant destruction with all his family if he dared to refuse. But Odenatus despised the haughty summons of Sapor, and opposing force by force, obtained some considerable advantages over the troops of the Persian king, took his wife prisoner, and, besides, obtained a great and rich booty. These services were observed with gratitude by the Romans; and Gallienus, then emperor, named Odenatus his colleague on the throne, and gave the title of Augustus to his children, and to his wife the celebrated Zenobia. Odenatus, invested with new power, resolved to signalize himself more conspicuously, by conquering the barbarians of the north; but he perished by the dagger of one of his own relations, whom he had slightly offended at a domestic entertainment. He died at Emessa, about the 267th year of the Christian era. Zenobia succeeded to his titles and honours.

ODENSEE, a city of Denmark, the capital of the island of Funen. It is situated on a canal connecting it with a lake, and in connection with the sea in the Gulf of Stegestrand. It is tolerably built, with good streets, and has a cathedral and seven other churches. It contains about 800 houses, with 6500 inhabitants, who are chiefly

VOL. XVI.

engaged in internal trade. Long. 11. 20. 4. E. Lat. 55. 23. 35. N.

ODER, a river of Germany, which has its source near a town of the same name in Silesia, and upon the confines of Moravia. It runs northward through that province, and then into the marche of Brandenburg and Pomerania, where it forms a large lake, and afterwards falls into the Baltic Sea by three mouths, between which lie the islands of Usedom and Wolin. It passes by several towns, as Ratibor, Oppeln, Breslau, Glogau, and Grossen, in Silesia; Frankfurt, Lebus, and Custrin, in Brandenburg; and Gartz, Stettin, Cammin, Wallin, Usedom, and Wolgast, in Pomerania.

ODESSA, a city of Russia in Europe, within the circle of Tiraspol, in the government of Cherson. It owes its present state, and the rapid advance it has made, to its position on the north-western shore of the Black Sea, between the mouths of two great rivers, the Dniester and the Dnieper, and being not more than twenty-four miles from the Bug, which is navigable from Poland.

From the reign of Peter the Great, Russia had been steadily looking forward to a maritime preponderance, both military and commercial, on the Black Sea; and soon after the peace of Oczakow, by which the province of Cherson was ceded to Catharine, that princess selected as the place for a commercial emporium a village called Kodschabey, then inhabited only by a few fishermen. At first several regiments were marched to the spot, and the erections of public buildings commenced. The first civil settlers were a number of Greek families, who were induced to remove thither from other portions of the country which had been recently given up by the Turks. When the Emperor Alexander ascended the throne, he entered with zeal into the project which Catharine had formed. The French emigrant Duke of Richelieu, who had entered the Russian service, was appointed governor, and displayed great zeal and judgment. By an imperial ukase, all taxes were suspended for sixty years; in consequence of which a considerable number of persons were induced to fix themselves in Odessa, so that by the year 1804 the inhabitants had increased to 15,000. With the progress of population that of public buildings kept pace. A fortress, a lighthouse, and a lazaretto, were constructed, as well as a mole to secure 300 sail of vessels from the south-west winds, which sometimes blow with prodigious force. The war between Russia and Turkey, which was terminated by the general European peace on the capture of Paris, had impeded till that event the growth of the city; but soon afterwards the port of Odessa was declared to be an open one. All goods of every kind could be imported without duty for the consumption of the city, or for re-exportation, but were chargeable with duty on passing into the surrounding country. This gave a great impetus to its advancement, which still operates, and in 1837 the population had increased to 63,092 persons. The inhabitants, as is natural in new settlements, are of very mixed races. The chief part of them consists of Russians, Greeks, and Jews; but German handicraftsmen are found amongst them in considerable numbers, whilst the more extensive mercantile houses are composed of Italians, English, French, or Armenians. In no spot perhaps in Europe are there so great a number of languages spoken as on the exchange of Odessa. The admixture of oriental dresses, manners, and languages, presents a very novel and lively picture. A stranger might imagine himself translated into one of the trading towns of the Levant; for the bazaars contain all the productions of the East, from Persian shawls down to rose-pastilles; and the Italian language is universally understood.

The prosperity of Odessa has risen in a great measure from its maritime accessibility. It has a spacious bay,

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Odessa.

Odessa. which, though open to the easterly winds, is tolerably secure; it is very extensive, and the anchorage ground is good. There is a kind of harbour formed by two moles, about two thirds of a mile in length, and a handsome quay capable of receiving vessels of 500 tons burden. The situation of the town on the shore, the land rising very gradually, gives it a good appearance on approaching it from the sea. Like most new places, it is regularly built; the streets are wide and straight, crossing each other at right angles; and the houses are for the most part built of stone, and two stories in height. The streets are however unpaved, and consequently in rainy weather present a mass of mud and dirt; and, on the other hand, when the weather is dry, the clouds of sand which arise prove a terrible annoyance. The place is defended by a strong citadel on the north-east, which has a double ditch, and also several outworks. The walls that surround the city are of more use in a financial than a military point of view. Amongst the public edifices, the most conspicuous is the cathedral, a large and elegant pile. There are eight other churches for the Greek worship, some belonging to the orthodox faith, and others to schismatics. The Jews, Roman Catholics, and German Lutherans, have their respective places of worship. A college has been established, with a museum and botanic garden. There is a large hospital, an assembly room, and a theatre, where plays are performed alternately in the Russian and Greek language, and which is sometimes used for the performance of Italian operas. There are several institutions for educating the poorer classes of both sexes; those for females being under the superintendence of the wife of the governor of the province, who resides here. Most of the water is brackish, and to provide that necessary element in purity, an aqueduct has been constructed, at an expense of more than a million roubles, which conveys it from a distance of nearly twenty miles. All the absolute necessities of life are remarkably cheap, as must be the case where a single town draws its supplies from a vast and fruitful plain like that which surrounds this city on the land side.

As the rapid growth of Odessa, and the prospect of its continued and increasing extent, depend wholly upon its commerce, it is desirable to take a view of the sources of that commerce. These are to be found in the fertility of its surrounding soil, and that of the more distant districts, to which there is easy access. The steppes, which form a semicircle around Odessa, being the *Sors Deserta* of the ancients, extend to nearly 100 miles from the city. This district is destitute of trees and of water, but the soil is said to be favourable to the growth of corn, especially of wheat. From February to May the growth of grass is most luxuriant, so that it is said to become so high as to hide the cattle; but in the latter month it begins to wither, and in the summer the land is so totally deprived of all verdure, as to present the picture of a dry sand-bank on the sea-shore. The first rains of autumn cause vegetation to shoot forth again with rapidity, till it is checked by the sharp frosts, sometimes of November, but more commonly of December. The slight attempts which have been made to cultivate this portion of land have for the most part been abandoned, and the labour of the residents has been chiefly applied to the feeding and propagating of sheep, and that more for the sake of the wool than of the flesh.

It is from districts bordering upon the northern side of the steppes that the land is to be found, the soil of which, even with the negligent husbandry it receives, is the most abundantly productive of wheat. Whether from the climate or the soil, or from the combination of both, or from other causes of which we are ignorant, there is no part of the world known in which, in propitious seasons, the increase of that grain is so great. It is, however, liable to

great variations in its growth, and sometimes years occur when the increase is very insignificant.

There are two kinds of wheat cultivated in the district, distinguished by the properties of the hardness or the softness of the grain. They are both white. The hard wheat is most proper for the countries bordered by the Mediterranean Sea, where it is not ground in mills, but is pounded in mortars, and used as food under the names of macaroni, vermicelli, and other similar preparations, which are eaten in those countries as a substitute for bread. The soft wheat comes from the most distant parts. It is the same as that grown in Poland, and brought to England sometimes by way of Dantzic, and occasionally by way of Odessa, and is, by grinding, converted into excellent flour. The hard wheat is sown in the spring of the year, and ripens almost as speedily as barley. The soft wheat is sown in October or November, before the frost sets in, and both ripen nearly together. The extent sown is in some measure regulated by the intelligence received of the productiveness of the preceding harvest in the several countries of Europe. If an extensive failure in the west of Europe is known to have occurred, the intelligence must arrive too late for any great extent of additional land being sown with winter or soft wheat; but as soon as the frost ceases, great activity in the labours of the field is applied to the preparation of the land, for the reception of the seed of spring or hard wheat. Thus the proportion which the two kinds of wheat bear to each other varies with the state of the annual product in those remote countries which draw their supplies from the Black Sea.

The greater portion of the wheat comes from a distance of 200 miles, some of it 250 miles; and in years when the demand is very great, a portion is brought even a distance of 400. A part of it is sent by the growers, or by merchants who have purchased of them, to be sold by the commission-houses in Odessa; but in some seasons large contracts are entered into for the wheat by Odessa merchants at a fair, to which sellers and buyers resort in great numbers, and which is held at the city of Kiew, from the 15th to the 25th of January in each year. The contracts are made for the corn to be delivered on shipboard by the sellers at their own expense, and the money to be paid on delivery; but it has occurred, in seasons when a very great demand was expected, as in 1817, that money has been advanced beforehand on the credit of the future delivery.

The wheat is brought in small waggons, drawn by two bullocks, and the number arriving in Odessa in one day has sometimes amounted to 500 or 600, and in several instances to 1000. Each of these waggons conveys eight sacks of wheat, and the whole load is three quarters and a half, weighing about 1700 pounds. They are dragged along at the rate of about ten miles a day. Though the cattle are grazed free of expense, on the pasture-land on the way, except over the steppes, where, in the months from May to July, the greatest periods of shipment, there are no vestiges of vegetation, the expense is still so considerable, that it has been often found to amount, when the prices have been low, to as much, and in some instances to even more, than the load would sell for at Odessa; and that, too, although the value of a day's labour for a man and two bullocks is only sixpence in Podolia, the province from which most of the wheat is brought.

The wheat is not dried before shipping at Odessa, as is done at Dantzic, and is, therefore, not well calculated for a long sea voyage, when, from heating, it becomes spoiled. This has been the case with cargoes sent to London, where, on its arrival, the grain has so run together as to be utterly unfit for food, and has been dug out with pick-axes and thrown into the Thames. The principal portion of the wheat from Odessa is sent thence to Constantinople, Malta, and the ports of Italy, France, and other dépôts in

Odessa. the Mediterranean. It is there often a substitute for wheat grown near them; and when this grain is scarce in England, and other distant markets, the produce of their own harvests is exported. The following table will show the fluctuations in the exports.

An Account of the Quantities of Wheat exported from Odessa in each Year from 1814 to 1836, from consular returns.

1814.....	187,685 quarters.
1815.....	372,309 ...
1816.....	801,591 ...
1817.....	870,893 ...
1818.....	538,513 ...
1819.....	627,926 ...
1820.....	534,199 ...
1821.....	435,305 ...
1822.....	342,752 ...
1823.....	443,035 ...
1824.....	427,767 ...
1825.....	170,370 ...
1826.....	Little or no demand, freights high, and no ships to be had.
1827.....	No trade in corn; all affairs suspended, from the state of public matters in Constantinople.
1828.....	Trade suspended by the war with Turkey.
1829.....	No trade in corn this year.
1830.....	149,209 quarters. All exported in the last three months of the year, when peace was concluded.
1831.....	No returns.
1832.....	401,981 quarters.
1833.....	101,000 quarters. All exported in the first three months of the year.
1834.....	45,000 quarters. Crops partially failed.
1835.....	283,575 ...
1836.....	452,714 ...

The variations in price during this series of years were excessive. Thus the average price of the year 1825, which was the lowest, was only 13s. 6d. the English quarter; and the average price of the year 1817, which was the highest, was 49s. 11d., being fluctuations to the extent of 375 per cent. The excessive fluctuations in the price, as well as the quantity of the exports, have had a great influence on the prosperity of the city, the chief export consisting of a single article. In the year 1817, the wheat shipped at Odessa was 870,893, at an average of 50s. the quarter, and thus amounting to L.2,177,232. The quantity shipped in 1825 was 170,370, at 13s. 6d. the quarter, thus amounting to no more than L.115,100. It is natural to suppose that a declension in the amount of a single article of exportable produce, to the extent of more than nineteen parts in twenty of its value, must have caused a great convulsion amongst the mercantile establishments at Odessa; and accordingly, in the eight years from 1817 to 1825, almost the whole of them were reduced to a state of insolvency. As regards the producers of the article in question, they too suffered severely. The high prices obtained in 1816 and 1817 gave an impulse to agriculture, which induced the proprietors of land to apply to its cultivation whatever capital they could obtain, either by their own credit, or by mortgaging their estates. The latter was effected with great facility, and to an extent which was severely felt for a long period by the larger proprietors. Many of the small cultivators, who occupied land belonging to the crown, on long leases, with neither rent nor taxes to pay for the first twenty-five years, were induced, by the low prices of wheat, to abandon their holdings, and to repair to the city, where they could obtain employment in the commonest kind of labour, with a better reward than cultivation yielded. Experience has taught the inhabitants the very fluctuating state of the commerce of wheat, and at length many of them have applied their capital and

their industry to the cultivation of other articles. The soil is found to be highly favourable to the growth of flax, but more especially to hemp; and large quantities of both are now raised. The breeding of black cattle has also been much extended, and creates a large export of hides and tallow. The tallow shipped increased between the years 1816 and 1831, from the value of 100,000 roubles to that of 2,000,000. Large flocks of sheep have also been reared, and the ancient breeds in many cases have been so effectually crossed by sheep of the Merino race, that much wool of an improved and still improving quality is despatched to Italy, France, England, and Germany. The old commercial houses, who had been ruined by the great depreciation in the price of wheat subsequently to 1817, have been replaced by new firms from Russia, Italy, Germany, France, and England, furnished with ample capital and credit. Some manufactures have been established, which yield a surplus of sail-cloth, cordage, and soap. The value of the exports, since the decline in the wheat trade, has more than doubled during the last ten years. The imports consist for the most part of coffee, sugar, olive-oil, cotton wool, wine, cotton, silk, and woollen goods, timber, coals, fruit, dye-stuffs, tea, and hardware. Odessa has also become a *dépôt* for an increasing trade with the ports of Asia on the Black Sea.

The number of vessels, and the flags they bore, that entered Odessa in the course of six years, were—

Austrian.....	953	French.....	17
Russian.....	732	Swedish.....	11
Sardinian.....	675	Spanish.....	8
British.....	598	Dutch.....	7
Greek.....	81	Tuscan.....	3
Turkish.....	32	American.....	2
Neapolitan.....	25		

The tonnage of these is not known; but as the Austrian and Russian vessels must have chiefly consisted of coasters from the ports of these nations within the Black Sea, it is probable they were of much lighter burden than the vessels of the other nations which had come through the Bosphorus. The vessels under the British flag belonged mostly to Malta and the Ionian Islands. The situation of Odessa is in latitude 46. 28. 54. north, and longitude 30. 43. 22. east. The climate is healthy, and the winter, though short, is severe, the sea being more or less frozen for about two months. The summer is intensely hot, but it is deemed salubrious.

ODEUM, in Grecian antiquity, a theatre for music built by Pericles, the inside of which was filled with seats and ranges of pillars, and on the outside the roof descended shelving downwards from a point in the centre, with many bendings, in imitation of the king of Persia's pavilion. Here the musical prizes were contended for; and here, also, according to Aristophanes, there was a tribunal.

ODIHAM, a market-town of the county of Hants, in the hundred of its own name, forty-two miles from London, and twenty-four from Winchester. It has a market, which is held on Saturday, and but little trade except what arises from its wharf on the Basingstoke Canal. A mile from it are the remains of an ancient castle, in which David king of Scotland is said to have been kept a prisoner. The population amounted in 1801 to 1058, in 1811 to 1104, in 1821 to 2423, and in 1831 to 2647.

ODIN, in *Mythology*, called also, in the dialect of the Anglo-Saxons, *Woden* or *Wodan*, a name given by the ancient Scythians to their supreme god, and assumed, about seventy years before the Christian era, by Sigge, a Scythian prince, who conquered the northern nations, made great changes in their government, manners, religion, and had even divine honours paid him. According to the account given of this conqueror by Snorro, the ancient historian of Norway, and his commentator Torfæus, Odin was

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a Scythian, who withdrew himself by flight, along with many others in his train, from the vengeance of the Romans, under the conduct of Pompey; and having officiated as a priest in his own country, he assumed the direction of the religious worship as well as the civil government of the nations which he had conquered. Having subdued Denmark, Sweden, and Norway, he retired to Sweden, where he died. There is nothing certain in this account; but it is probable that the god whose prophet or priest this Scythian pretended to be, was named Odin, and that the ignorance of succeeding ages confounded the deity with his priest, composing out of the attributes of the one and the history of the other the character of the northern conqueror. He deluded the people by his enchantments and his skill in magic. Having cut off the head of one Mimer, who in his lifetime enjoyed great reputation for wisdom, he caused it to be embalmed, and persuaded the Scandinavians that he had restored it to the use of speech, and caused it to pronounce whatever oracles he wanted. The Icelandic chronicles or sagas represent Odin as the most eloquent and persuasive of men; they ascribe to him the introduction of the art of poetry amongst the Scandinavians, and likewise the invention of the Runic characters. He had also the address to persuade his followers that he could run over the world in the twinkling of an eye; that he had the direction of the air and the tempests; that he could transform himself into all sorts of shapes, raise the dead, foretell things to come, deprive his enemies by enchantment of health and vigour, and discover all the treasures which were concealed in the earth. They add, that by his tender and melodious airs he could make the plains and mountains open and expand with delight; and that the ghosts, thus attracted, would leave their infernal caverns, and stand motionless about him. Nor was he less dreadful and furious in battle; changing himself into the shape of a bear, a wild bull, or a lion, and amidst ranks of enemies committing the most horrid devastation, without receiving any wound in return.

ODOACER, according to Ennodius, was meanly born, and only a private man in the guards of the Emperor Augustulus, when, in the year 476, under the consulship of Basilicus and Armatus, the barbarians chose him for their leader. The barbarians thought that, as they often defended Italy, they had a right to at least part of it; but upon demanding this they were refused, and the consequence was a revolt. Odoacer is said to have been a man of uncommon parts, capable alike of commanding an army or of governing a state. Having left his own country when he was very young, to serve in Italy, he was admitted amongst the emperor's guards, and continued in that station till the above year; when, putting himself at the head of the barbarians in the Roman pay, who, although of different nations, had unanimously chosen him to be their leader, he marched against Orestes, and his son Augustulus, who still refused to share any of the lands in Italy. The Romans were inferior both in numbers and in valour, and were, therefore, easily conquered. Orestes was ordered to be slain; but the Emperor Augustulus was spared, and, although stripped of his dignity, was treated with humanity, and allowed a liberal sum for his own support and for that of his relations. Odoacer was proclaimed king of Italy, but assumed neither the purple nor any other mark of imperial consequence. He was afterwards defeated and slain by Theodoric the Ostrogoth.

ODOMETER, an instrument used for measuring the distance passed over in travelling.

ODOROUS, or ODORIFEROUS, appellations given to whatever smells strongly, whether they be fetid or agreeable, but chiefly to things the smell of which is brisk and pleasant.

ECONOMICS, the art of managing the affairs of a

family or community; and hence the person who takes care of the revenues and other affairs of churches, monasteries, and the like, is termed *oconomus*.

ECUMENICAL signifies the same with *general* or *universal*; as, ecumenical council, bishop, and the like.

OEDENBURG, a city of the Austrian kingdom of Hungary, in the province of the Farther Danube. It is the capital of a circle of the same name (called also Soprony-Barmegye in Hungarian), which extends over 1269 square miles, and comprehends three cities, forty-one market-towns, and 200 villages, with 185,700 inhabitants. It stands on the river Ikva, and is a well-built town, with one Lutheran and two Catholic churches, a monastery and a nunnery, 820 houses, and 12,650 inhabitants, of whom about 5000 are Protestants. It is an industrious place, with manufactures of cotton, woollen, silk, and linen goods, besides glass-houses, sugar refineries, and iron forges; and the neighbourhood yields some good wine. Long. 17. 28. 11. E. Lat. 47. 40. 36. N.

ÆDIPUS, an unfortunate king of Thebes, whose history is partly fabulous. He flourished about 1266 before Christ. It is said he was given by his father to a shepherd, who was ordered to put him to death, in order to prevent the misfortunes with which he was threatened by an oracle. But the shepherd, being unwilling to kill him with his own hands, tied him by the feet to a tree, that he might be devoured by wild beasts. The infant was however found in this situation by another shepherd named Phorbas, who carried him to Polybus king of Corinth, whose queen, having no children, educated him with as much care as if he had been her own son. When he had grown up, he was informed that he was not the son of Polybus; upon which, by order of the oracle, he went to seek for his father in Phocis; but scarcely had he arrived in that country when he met his father on the road, and killed him without knowing him. A short time afterwards, having delivered the country from the monster called the *Sphinx*, he married Jocasta, without knowing that she was his mother, and had four children by her; but afterwards, being informed of his incest, he quitted the throne, and, thinking himself unworthy of the light, put out his eyes. Eteocles and Polyneices, both celebrated amongst the Greeks, were the issue of this incestuous marriage.

OEGWA, a town on the Gold Coast of Africa, situated upon the brow of an eminence, which rises by a gentle ascent to a considerable height, and is defended by rocks, against which the waves beat with the utmost violence.

OEHRINGEN, a city of the kingdom of Wirtemberg, in the circle of the Jaxt, the capital of a bailiwick of the same name, in the territories of the mediatised Prince of Hohenlohe-Oehringen. It stands on the river Ohra, is the residence of the prince, and contains, besides the palace, 480 houses, with 3327 inhabitants, who are occupied in making jewellery and gold and silver articles, also in the cotton manufacture, and in growing wine.

OELAND, or OLAND, an island in the Baltic Sea, a part of the province of Calmar, in Sweden. It is about seventy miles in length from north to south, and about seven miles in breadth from east to west. The western side is flat, and the eastern rather hilly; but the centre is a level consisting of tolerably good soil, which yields barley, rye, and oats, and, from the mildness of the climate, brings the harvest two weeks earlier than on the opposite continent. It has some good pastures, which furnish dairies; and a considerable fishery is carried on upon the coast. It contains no market-town, but has eight parishes, and 24,000 inhabitants.

OELS, a circle of the Prussian province of Silesia, which has become remarkable on account of its having been bestowed on the Duke of Brunswick when expelled from his hereditary dominions by Bonaparte. It was for-

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merly a sovereignty, but is now mediatized; and the ancient race of its dukes has become extinct. It extends over 814 square miles, and contains nine cities and towns, 344 villages, and 164 hamlets, inhabited by about 95,000 persons. The chief place is the city of the same name situated on the river Oelse, which runs to the Weyda in its course to the Oder. It is surrounded with walls, and contains one Catholic and five Lutheran churches, 480 houses, and about 5000 inhabitants. In the ancient castle of the dukes is a numerous library and a cabinet of natural history. The chief employment of the inhabitants is in the linen trade.

ÆNOPTÆ, in Grecian antiquity, a kind of censors at Athens, who regulated entertainments, and took care that none drank too much or too little.

CEREBRO, one of the provinces of the kingdom of Sweden, being the westernmost part of Westmanland. It extends in north latitude from 58. 40. to 60. 6. and in east longitude from 14. 6. to 15. 42., and contains a superficies of 3784 square miles. It is divided into four districts or bailiwicks, viz. Osterwick, Westericke, Nora cum Linne, and Leke cum Carlsrona, and contains 110,000 inhabitants. It is surrounded with mountains, but none of them higher than 2000 feet, and the interior is flat or undulating. It is an internal province, but connected with Stockholm by means of the river Heilmaren. It contains a great number of fresh-water lakes. The climate is raw and cold, but in the short summer vegetation is surprisingly rapid. The best agriculture is in the southern part, but there the seed rarely produces more than four-fold. The chief grains are rye, oats, and barley; and of late potatoes and turnips have been introduced. The chief production is timber, and the cutting and preparing of it for market is the principal occupation. There are some mines of iron and of copper worked. The capital is the city of the same name, situated at the entrance of the river Svartelf into the Heilmaren. It is chiefly built of wood, has a good market, a church, and an hospital, and contains 750 dwellings, with 3240 inhabitants, a few of whom are employed in making cloths, hosiery, and ironmongery articles. Long. 15. 4. 5. E. Lat. 59. 15. 14. N.

ÆTA, in *Ancient Geography*, a mountain of Thessaly, extending from Thermopylæ westward to the Sinus Ambracicus, and in some measure cutting at right angles the mountainous country stretching between Parnassus to the south and Pindus to the north.

OETTINGEN, a city of the kingdom of Bavaria, in the circle of the Rezat, which, with a district around it of seventy square miles and 12,500 inhabitants, forms a bailiwick belonging to the mediatized Prince of Oettingen-Oettingen. The city is the residence of the prince. It stands on the river Wernitz, is well built, and contains a Catholic and a Lutheran church, 460 houses, with 3480 inhabitants, who are chiefly employed in making linen and cotton goods. Long. 10. 31. 5. E. Lat. 48. 57. 27. N.

OFFENBACH, a city of the grand duchy of Hesse, in Germany, in the province of Darmstadt, and the capital of a bailiwick of the same name. It stands on the river Maine, and is well built, being on one side surrounded with a wall, and on the other with a ditch. It contains 530 houses, with 6950 inhabitants, who are chiefly occupied in making iron and hardware, and a variety of ornamental articles of steel, silver, and gold.

OFFERINGS. Amongst the Hebrews there were several kinds of offerings, which they presented at the temple. Some were free-will offerings, and others were offerings of obligation. The first fruits, the tenths, and the sin-offerings, were of obligation; the peace-offerings, vows, offerings of wine, oil, bread, salt, and other things, which were made to the temple or to the ministers of the Lord, were offerings of devotion. The Hebrews called offerings in general *cor-*

ban. But the offerings of bread, salt, fruits, and liquors, as wine and oil, which were presented at the temple, they termed *mincha*. The sacrifices are not properly offerings, nor are they commonly included under that name.

OFFICIAL, in the canon law, an ecclesiastical judge, appointed by a bishop, chapter, or abbot, with charge of the spiritual jurisdiction of the diocese.

OFFICIAL is also a deputy appointed by an archdeacon as his assistant, and who sits as judge in the archdeacon's court.

OFFICINAL, in *Pharmacy*, an appellation given to such medicines, whether simple or compound, as are required to be constantly kept in the apothecaries' shops.

OFFING, or OFFIN, in nautical language, that part of the sea a good distance from shore, where there is deep water, and no need of a pilot to conduct the ship. Thus, if a ship from shore be seen sailing out to seaward, they say, "she stands for the offing;" and if a ship, having the shore near her, have another a good way without or beyond her, towards the sea, they say, "that ship is in the offing."

OGHAMS, a particular kind of stenography, or writing in cipher, which was practised by the Irish. Of these there were three kinds. The first was composed of certain lines and marks, which derived their power from their situation and position, as they stood in relation to one principal line, over or under which they were placed, or through which they were drawn. The principal line was horizontal, and served for a rule or guide, the upper part of which was called the left, and the under side the right; above, under, and through which line, the characters or marks were drawn, that stood in the place of vowels, consonants, diphthongs, and triphthongs.

OGIVE, in *Architecture*, an arch or branch of a Gothic vault, which, instead of being circular, passes diagonally from one angle to another, and forms a cross with the other arches. The middle, where the ogives cross each other, is called the *key*, being cut in the form of a rose, or a *cul de lampe*. The members or mouldings of the ogives are called *nerves*, *branches*, or *reins*; and the arches which separate the ogives, *double arches*.

OGYGES, king of the Thebans, or, according to others, of Ogygia and Actæ, afterwards called Bœotia and Attica. He is recorded to have been the first founder of Thebes and Eleusis. The famous deluge happened in his time, in which some say he perished, along with all his subjects, 1796 before our era.

OHANG JAVA, a cluster of islands in the Pacific Ocean, discovered by Tasman. Most of them are little better than large rocks. Lat. 4. 36. N.

OHETEROA, an island about twelve miles in circumference, in the South Pacific Ocean, without either harbour or anchorage, and only a foul and rocky bay on the west coast. The inhabitants are active, well made, and of a dark complexion. They form circles round their arms and legs, but have no figures on the other parts of their body. Their clothing is made of the bark of a tree, and is curiously coloured; and some of them wear bonnets, adorned with feathers, whilst others wear white stuff in the form of a turban. Their arms are lances made of very hard wood, and long pikes. This island was first discovered by Captain Cook in the year 1769. It is well inhabited, though it is not twenty miles in circumference. It has not, like the Society Islands, any coral reef surrounding it. Long. 150. 47. W. Lat. 22. 27. S.

OHEVAHOA, a steep and craggy island in the Southern Pacific Ocean, about fifteen leagues in circumference. Its deep valleys, and the sides of its hills, are clothed with trees and with verdure. It is situated in long. 139. 2. W. and lat. 9. 42. S.

OHIO, one of the principal states in the North American union, is situated between 38. 30. and 42. 0. of north la-

Official
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Ohio.

Ohio.

itude, and between 80. 28. and 84. 42. longitude west from Greenwich. On the north it is bounded by Michigan and Lake Erie; on the east by Pennsylvania and the river Ohio; on the south by the Ohio River, which separates it from Virginia and Kentucky; and on the west by Indiana. Ohio may extend about 220 miles from north to south, and as much from east to west; but as Lake Erie projects considerably into the northern borders, and the Ohio cuts off much of its southern quarter, the area of the state cannot be computed at more than 200 miles square. Ohio occupies about one third of the plane which declines from Pennsylvania to the Mississippi, and may be considered generally as a surface of table-land, sloping in one direction towards the Ohio, and in the other towards Lake Erie. The state is divided by nature into four grand divisions, which are named after the principal waters on which they are situated. These are the Miami country, the Scioto country, the Muskingum country, and the Lake country. The interior and northern parts of Ohio are generally level, but the northern belt has large tracts of wet and marshy soil. They are however placed in such positions as render them easily drained; and when they are cleared of the forests which cover them, they will form not the least valuable parts of the state. In its primitive condition, Ohio was, with the exception of some central prairies, overspread with a dense forest, to which the great fertility of the soil gave a stupendous development; indeed the size, majesty, and variety of the trees of the Ohio basin has been a theme of just admiration. There are still extensive tracts of land heavily timbered, and which are as level as prairies. The forest-trees are the same as those of Kentucky and Indiana, excepting that the peccan tree, which is common on the waters of the Wabash, is seldom found here. The forests are deep, and some of them are in the richest soils, where, however, the trees are less remarkable for their size than for their straightness. On the head waters of the two Miamis, the Muskingum, and the Scioto, there are rich and extensive prairies, some of which are low and marshy, and others are elevated and dry, the latter being by no means so fertile as the former. Immediately on the borders of the Ohio, there are numerous tracts of intervale or meadow-land of exuberant fertility. In the interior parts, bordering on both sides of the Scioto, and on the two Miamis, are the most extensive tracts of rich and level land. About one quarter of the eastern and south-eastern divisions of Ohio is hilly, in some places too broken, and precipitous to admit of cultivation; but in no parts are the hills very large or high, and nine tenths of the surface of the state are susceptible of cultivation. "On its whole wide surface," says Mr Flint, "there is scarcely any land so hilly, sterile, or marshy, as, with moderate labour, may not be subdued, drained, or cultivated. The whole region seems to have invited a hardy and numerous body of freeholders to select themselves moderate and nearly equal-sized farms, and to intersperse them over its surface. In respect to the smallness of the farms, the number, equality, and compactness of the population, not confined, as farther west, to the water-courses, but diffused over the whole state, it compares very accurately with New England."

Rivers.

The principal river of Ohio is the noble and beautiful stream to which it owes its name; but this will demand a separate notice. The next largest and most interesting river in this state is the Great Miami, which rises between 40 and 41 degrees of north latitude, and interlocks with the Massis-sineway of the Wabash, and the St Mary's and Au Glaize, branches of the Maumee and Scioto. It has a south-westerly course of above fifty miles, flowing in a strong but generally smooth and unbroken current, through a valley of uncommon width and fertility, receiving several tributaries in its course. The Little Miami rises in the south-west corner of Madison county, and, after traversing several

counties, joins the Ohio seven miles above Cincinnati. It is of little importance as a navigable stream; but it is valuable in a manufacturing point of view, there being upwards of sixty mills upon it. It has a number of branches; and about one hundred miles from its mouth it forms singular rapids, the stream being compressed to ten yards in width, and falling two hundred feet within no great distance. The country between the Great and Little Miami is in general finely watered, healthy, pleasant, and fertile, and may be characterised as the garden of the state. The Scioto is a considerable river of Ohio, and has the whole of its course in the state, being little short of two hundred miles, one hundred and thirty of which are navigable. It rises in a morass north of Logan county, in the southern division of the state, and has generally a south-easterly course. The banks of the Scioto now rank amongst the most fertile, eligible, and pleasant parts of the state. Between this river and the Muskingum is situated the great Hockhocking and its waters. It has a deep and still but narrow channel, and is navigable for boats forty miles above its mouth, having also a number of mills erected on it. The Muskingum rises near the sources of the Cuyahoga of Lake Erie, in the southern part of Connecticut Reserve. Its course is remarkably sinuous, but its general direction is to the southward. It has a long course, traversing a number of counties, is boatable in good stages of the water one hundred miles by the course of the river, and enters the Ohio at Marietta by a mouth two hundred and fifty yards wide. The Mahoning is also a large stream, which, with those already described, may be considered as belonging to the southern division of the state. In the north there is the Maumee, which rises in the north-eastern angle of the state of Indiana, and flows in a north-eastern direction, across the north-western borders of the state of Ohio, into the western extremity of Lake Erie. This important river has a course of one hundred miles, and is a broad, deep, navigable stream. It has a valuable fishery, and its banks in the season of vegetation are remarkable for the luxuriance of their verdure. The St Joseph, the St Mary's, and the Great and Little Au Glaize, are considerable tributary streams of the Maumee. The Sandusky rises in the western limits of Richland county, and runs in a general north-west direction ninety miles to the lake. It is more rapid than the other lake streams, but yet affords good navigation. Cuyahoga rises in the central parts of Geauga county, and falls into the lake at Cleveland, after a course of sixty miles, for the greater part of which distance it is boatable. Chagrin, Grand, Ashtabula, and Coneaught, are considerable streams, which rise near the lake, run in a northerly direction, and discharge their waters into it.

Ohio possesses an extensive and rich coal region in its eastern and north-eastern divisions, on the Muskingum, the Hockhocking, and the Scioto. The mineral is not only in great abundance, but of the best quality; and in the same region vast quantities of iron ore are found. Limestone, marble, and freestone abound; they are easily accessible, and are admirably adapted to building and public works. The useful earths and fossils are also in abundance. Specimens of gypsum are procured from Sandusky Bay. Salt springs are common, and some of them contain as much saline matter as the waters of the ocean. Nearly half a million bushels of salt are annually manufactured in the state. Those springs the waters of which are drank for medicinal purposes are most of them more or less impregnated with muriate of soda. The Yellow Springs, the most celebrated watering-place after Harrodsburgh Springs in the western country, are situated near the falls of the Miami, sixty-three miles from Cincinnati. The antiquities which belong to this state are somewhat similar to those described in the article NEW YORK; mounds of earth, in which have been found domestic utensils, pottery, vases, and trinkets.

Ohio.

Ohio. Instruments of warfare have likewise been dug up, amongst which Mr Flint mentions a curious sword and an iron horse-shoe of a diminutive size.

Climate. Except along the deep vales of the Ohio, and those of the other streams near their influx into that great recipient, the climate is as uniform as the surface, and considerably more severe in the winter season than in corresponding latitudes on the Atlantic. But the other seasons are warmer, and the nature and luxuriance of the vegetation indicates a temperature of greater mildness in general. The summers are warm, and pretty regular, although to a certain extent subject to tornadoes. The central parts of the state are in the same latitude with Philadelphia. The mean temperature of the year at this city was found to be 53°; but during the same year that of Ohio was two degrees higher. As we recede from the Ohio, the temperature diminishes in a greater ratio than the latitude would indicate; but in general throughout the state there is a striking correspondence between the two. Whilst the summers are warm, the winters are very severe, and the river Ohio has occasionally been crossed at Cincinnati for nine consecutive weeks. At other times this season of the year is mild; but during the winter months the transitions from heat to cold and the reverse are frequent and violent. In that part of the state which slopes to the south, the snow seldom falls deep or lies long; but in Connecticut Reserve, and in the points which slope towards the lakes, they have deep and durable snows. Autumn is almost uniformly temperate, dry, and beautiful; and spring is also a pleasant season. The winds of Ohio, whether high or low, generally blow from the west and south-west at all times. In some parts, near marshes and stagnant waters, fevers and agues frequently prevail; but the climate in general is decidedly healthy.

Soil and productions. The soil and the climate of Ohio together are admirably adapted to the most valuable vegetable productions which grow in such a latitude. The soil is very productive, without, however, being so remarkable in this respect as some parts of Illinois and Missouri. After the severity of winter abates, which is early in February, vegetation begins to put forth its powers; and as the heat of spring and summer takes effect upon the soil, it advances with astonishing rapidity. Ohio, generally, has a soil admirably adapted to wheat. Indian corn is the staple grain, and it is nowhere raised more easily, or in greater abundance. On rich alluvial soils 110 bushels have been produced from an acre; but fifty may be considered as about the average crop. Rye, barley, oats, spelts, buckwheat, and all other grains, are raised in great abundance and perfection. Melons, squashes, pumpkins, the pulses, garden vegetables both bulbous and others, as potatoes, onions, beets, carrots, parsnips, asparagus of the best description, and various culinary products of the soil, attain the highest development. From its stiff, clayey nature, the soil retains moisture well, and is better fitted for gardens than the soils farther west. Fruits of all kinds are raised in the greatest profusion; and apples in particular are very plentiful. Pears, plums, peaches, cherries, strawberries, grapes, and what not, are cultivated to such an extent as amply to supply the markets. "In a few years," says Mr Flint, "this state will take place of any in the Union, in the abundance and excellence of its fruits of all kinds. From the fulness and richness of the clusters of cultivated grapes, it is clear that this ought to be a country of vineyards. The Germans have already made a few establishments of the kind with entire success. Apricots, nectarines, and quinces succeed; and this state is the appropriate empire of Pomona. Recently, tobacco has been added to the articles cultivated. ...Hemp is an article of cultivation in some parts of the state. Agricultural improvement, however, proceeds with slow pace. The people generally are not at all given to ex-

periment, and continue to farm in the old and beaten routine.... Besides trees, shrubs, and vines, this state produces a great abundance of indigenous productions that are useful in medicine. We may mention *actea racemosa*, squaw root, Virginia snake root, Indian turnip, ginseng, which is dug in considerable quantities as an article of commerce, colombo, labelia, valerian, blood root or sanguinaria, canadensis, and various other herbaceous medicinal plants."

This state, being more populous than any other in the west, and possessing in many respects manufacturing capabilities, has taken precedence of all the rest in manufactures. Cotton yarn, cloth, and woollen goods, are already manufactured to a considerable extent, as are also flour and spirits; and family manufactures are likewise industriously prosecuted. The principal domestic articles of trade are horses, cattle, swine, whisky, flour, and tobacco. Those articles which are exported from the northern and some interior counties are frequently sent to Montreal and New York markets, by way of Lake Erie. From the southern parts of the state they are transported down the Ohio and Mississippi to New Orleans. Foreign goods are received from the same place by the steam-boats, and from Philadelphia and Baltimore across the Alleghany Mountains. "The surplus produce of the state of Ohio," says Mr Pitkin, in his Statistical View of the Commerce of the United States, "it is believed, may be calculated at about ten millions. The exports of Cincinnati alone, in 1833, were valued at five millions of dollars. This amount does not probably exceed the truth, when it is considered that the number of hogs slaughtered in that city in 1833 was 123,859, which would make as many, and probably more, barrels of pork, and, in the same year, 21,880 barrels of pork came to that city by the Miami Canal, making about 150,000 barrels in the whole, and which, at nine dollars per barrel, would be 1,359,000 dollars; and that in 1834, the number slaughtered was 150,000. And we cannot but here remark, that the whole quantity of pork exported from the United States in 1833 was only 105,870 barrels, leaving in favour of Cincinnati 45,000 barrels." It is of course taken for granted, that of the 150,000 barrels of pork said to be made at this city, all above the 45,000 entered as having been exported was reserved for home consumption. Mr Pitkin continues, "the exports of Cleveland on Lake Erie, in the same year, was 1,794,000 dollars coastwise, and 250,000 to foreign places, and from Huron 274,840 dollars; and from the country of Muskingum, on the river of that name, and from the flourishing village of Zanesville, with her numerous flourishing mills, as ascertained by those well acquainted with the facts, was 500,000 dollars. The value of the exports from these places alone make about seven millions and three quarters; and when it is considered that the quantity of tobacco raised in Ohio in 1833 was 10,000 hogsheads, only 3000 of which is included in the above exports from Muskingum, and when to these are added the exports from the Sciota valley, and from many other places on the Ohio River, and on the lake, we apprehend that the surplus produce of Ohio cannot be less than ten millions of dollars."

The following account of the statistics of Ohio for 1836 Statistics. is taken from the American Almanac for 1837.

Value of Taxable Property.

	Dollars.
Lands (17,819,631 acres), including buildings.	58,166,821
Town lots, including houses, mills, &c.....	15,762,594
Horses (262,291, valued at forty dollars each).....	10,491,640
Cattle (455,487, valued at eight dollars each)....	4,043,896
Merchants' capital and money at interest.....	7,262,927
Pleasure-carriages, 2603, valued at.....	199,518
Total.....	95,927,396

Ohio.

Taxes Levied.

	Dollars.
State and canal tax.....	142,854-15
County and school tax.....	396,505-80
Road tax.....	66,482-16
Township tax.....	102,991-65
Corporation, jail, and bridge tax.....	51,276-89
Physicians' and lawyers' tax.....	3,144-19
School-house tax.....	1,482-84
Delinquencies of former years.....	13,044-37
Total.....	777,782-05

Foreign debt, 4,400,000 dollars;—legal interest...260,000
 Domestic do.....579,287 dollars;—ditto.....34,757

Total...4,979,287 294,757

Canal tolls for 1835, and receipts from the sale
 of Ohio canal lands.....306,906

Amount of school funds on loan to the state,
 15th November 1835.....803,432

Although the first permanent settlement was made in Ohio not more than fifty years ago, and although it was admitted into the Union as a state as recently as 1802, yet it has now become one of the most considerable states in the union, has entered largely into the system of internal improvement, and has constructed one of the longest canals in the world. The state canals are under the direction of a board of canal commissioners; and the Ohio and Miami Canals, which, together with their branches, are more than four hundred miles in extent, have been constructed at the expense of the state. For an account of the canals of Ohio, see the article NAVIGATION, INLAND.

Railroads. Railroads have likewise been constructed on the same extensive scale, and numbers of them are in course of being laid. Mad River and Lake Erie Railroad, extending from Dayton to the city of Sandusky, is to be 153 miles in length. The Pennsylvania and Ohio Railroad is designed to commence at Pittsburgh, and terminate at Massillon on the Ohio Canal, the length being 180 miles. There are some others of smaller size; and some idea may be formed of the extent to which these works are carried, from the fact that no less than twenty-eight companies were incorporated in the year 1836. In connection with trade and internal improvement may be mentioned the banks of Ohio. In the year 1835 there were thirty-one banks in this state; and the condition of twenty-nine of these, from which returns were received, was, that they had of specie 1,906,715, and of capital 6,390,741; and that their circulation was 5,654,048. The legal interest in Ohio is six per cent.; but there is no law against usury, so that in some parts it is seldom less, and often more, than ten per cent.

Education and literature. A laudable zeal has been shown to diffuse education throughout this state. In the year 1825 the New England system of tuition was introduced into Ohio, and by various emendatory enactments it has now acquired a degree of form and consistency. By an act of the state the trustees of every incorporated township are required to divide it into a suitable number of school districts, the prudential concerns of which are managed by three school directors, a clerk, and a treasurer. The funds for maintaining this vast system arise from various sources besides the easy tax of one mill upon a dollar, constituting a large and growing revenue. By this act it is provided that the youth of every class, without distinction, shall be instructed in reading, writing, and arithmetic, as well as in other necessary branches of education. There are no less than nine colleges or universities, viz. the university of Ohio, at Athens, with five instructors, seventy-two alumni, twenty-six ministers, forty-five students, and about a thousand volumes in the college library, and as many in that of the students;

the Miami university, at Oxford, with eight instructors, eighty alumni, seventeen ministers, one hundred and twenty-six students, and 1200 and 2500 volumes respectively in the college and students' libraries; the Franklin university, at New Athens; the Western Reserve university, at Hudson; the Kenyon university, at Gambier; the Granville university, at Granville; the Marietta university, at Marietta; the Oberlin institution, at New Illyria; and the Willoughby university, at Chagrin; all of which are smaller than the first two, but have from fifty to one hundred students. There are five theological seminaries, a presbyterian college at Cincinnati, and another at Hudson, a Protestant episcopal college at Gambier, a Lutheran theological school at Columbus, and a Baptist institution of the same kind at Granville. There are two medical schools; one at Cincinnati, having six professors, and another at Northring, with four professors. There is a law college at Cincinnati, which has three professors. Amongst institutions of a public character may be mentioned an asylum for the deaf and dumb, which has been established at Columbus. Literature is making considerable progress in Ohio. In 1810 there were only fourteen newspapers in the state, and in 1834 their number amounted to 140. There are, besides, several other periodicals of a literary and scientific nature.

Almost every religious denomination is found in this Religion. state, but the Presbyterians and Methodists predominate. In 1831, which is the latest complete return that we have obtained, the numbers were, of Presbyterians, 22,150 communicants, having 346 churches; of Baptists, 8801 communicants, having 240 churches; of Methodists, 36,064 members; of Lutherans, 8706 communicants; of Associate Presbyterians, sixty-five congregations; of German Reformed, eighty-two congregations. The Episcopalians had also sixteen ministers, and the New Jerusalem church four societies; and there were, besides, a number of Friends and Roman Catholics, and some Universalists, Unitarians, and Shakers. "It is affirmed by a gentleman," says Mr Flint, "well known for his researches into the antiquities of this state, that there is a greater number of professors of religion, in proportion to the whole number of the people, than in any state in the Union. There are a vast number of religious societies; but there is not a great number that have regularly established pastors. The custom of itinerating preaching, as a supply, is very prevalent. The people are generally a quiet, orderly, peaceable, moral, and industrious race. Suicide, excesses, murders in affray, and instances of deliberate and atrocious cruelty, are rare; and the general moral character of the people is highly respectable."

From the census of 1830 we learn that there were at that time in Ohio the remains of Indian tribes, amounting to 2350 persons. They then owned 390,846 acres of land, besides 16,200 acres which were secured to individuals belonging to the several tribes. These lands are secured by treaty to the Wyandotes, Shawnees, Senecas, Delawares, and Ottawas; the other remnants of tribes being classed with these. Some of them have sold their shares; but to those which still hold them, considerable annuities are paid by the national government. The number of individuals belonging to these tribes is gradually diminishing, and they must soon entirely disappear in the tide of white population which is fast overspreading their native territories. There are not many negroes in Ohio, and none are held as slaves. Few descriptions of the inhabitants are exempted from military duty. The militia of this state is principally composed of hardy agriculturists, and exceeds one hundred and fifty thousand men. A portion of the land in Ohio still belongs to the United States. In the north-east part of the state there is a tract containing 3,300,000 acres, called New Connecticut, or Connec-

Ohio.

Ohio. ticut Western Reserve. The fee of these lands is in the acres, called the Virginia military lands, which are situ- Ohio.
state of Connecticut, but Ohi has the jurisdiction. The ated between the Scioto and Little Miami Rivers. The
state of Virginia also owns a tract of above four millions of following table exhibits the

Population of the Counties and County Towns of the State of Ohio in 1830.

Counties.	Population in 1830.	Square Miles.	County Towns.	Popula- tion.	Distance from	
					Cincinnati.	Washington.
Adams.....	12,278	550	West Union.....	429	101	460
Allen.....	578	542	Wapaghkonetta.....	...	110	507
Ashtabula.....	14,584	705	Jefferson.....	270	191	325
Athens.....	9,763	744	Athens.....	729	73	344
Belmont.....	28,412	536	St Clairsville.....	789	124	275
Brown.....	17,867	492	Georgetown.....	325	104	480
Butler.....	27,044	486	Hamilton.....	1,097	101	488
Champaign.....	12,130	417	Urbana.....	1,102	50	447
Clark.....	13,074	412	Springfield.....	1,080	43	437
Clermont.....	20,466	515	Batavia.....	426	109	476
Clinton.....	12,292	400	Wilmington.....	607	67	444
Columbiana.....	35,508	865	New Lisbon.....	1,138	152	282
Coschocton.....	11,162	562	Coschocton.....	333	84	336
Crawford.....	4,778	584	Bucyrus... ..	298	69	409
Cuyahoga.....	10,360	475	Cleveland.....	1,076	138	354
Dark.....	6,203	660	Greenville.....	160	103	501
Delaware.....	11,523	610	Delaware.....	532	23	419
Fairfield.....	24,788	540	Lancaster.....	1,530	28	372
Fayette.....	8,180	415	Washington.....	300	45	422
Franklin.....	14,766	520	Columbus.....	2,437	...	396
Gallia.....	9,733	495	Gallipolis.....	755	108	362
Geauga.....	15,813	600	Chardon (township).....	881	157	332
Green.....	15,084	416	Xenia.....	919	57	453
Guernsey.....	18,036	621	Cambridge.....	518	83	314
Hardin.....	...	500	Hardy.....	...	66	436
Hamilton.....	52,321	400	Cincinnati.....	24,831	112	497
Hancock.....	813	575	Findlay.....	52	114	502
Harrison.....	20,920	450	Cadiz.....	820	124	278
Henry.....	260	474	Damascus.....	...	161	485
Highland.....	16,347	555	Hillsborough.....	564	74	441
Hocking.....	4,008	432	Logan.....	97	47	370
Holmes.....	9,133	400	Millersburg.....	319	80	341
Huron.....	13,345	840	Norwalk.....	310	113	399
Jackson.....	5,974	492	Jackson.....	329	74	387
Jefferson.....	22,489	400	Steubenville.....	2,937	149	260
Knox.....	17,124	610	Mount Vernon.....	1,021	45	375
Lawrence.....	5,366	426	Burlington.....	149	135	405
Licking.....	20,864	666	Newark.....	999	34	362
Lorain.....	5,696	555	Illyria.....	668	130	377
Logan.....	6,442	425	Belle Fontaine.....	266	62	458
Madison.....	6,190	448	London.....	249	27	423
Marion.....	6,558	527	Marion... ..	287	47	416
Medina.....	7,560	473	Medina (township).....	622	111	357
Meigs.....	6,159	405	Chester.....	164	94	343
Mercer.....	1,110	570	St Mary's.....	92	111	508
Miami.....	12,806	444	Troy.....	504	78	474
Monroe.....	8,770	563	Woodsfield.....	157	140	294
Montgomery.....	24,252	450	Dayton.....	2,965	66	462
Morgan.....	11,796	500	M'Connesville.....	267	70	340
Muskingum.....	29,325	664	Zanesville.....	3,094	59	336
Paulding.....	160	432	...	...	...	...
Perry.....	14,018	402	Somerset.....	576	46	354
Pickaway.....	15,935	495	Circleville.....	1,136	26	394
Pike.....	6,024	414	Piketon.....	271	65	409
Portage.....	18,827	752	Ravenna (township).....	806	127	320
Preble.....	16,255	432	Eaton.....	511	92	488
Putnam.....	230	576	Sugar Grove.....	...	148	538
Richland.....	24,007	900	Mansfield.....	840	71	380
Carry forward.....	764,727	31,032				

Ohio.

Ohio.

Counties.	Population in 1830.	Square Miles.	County Towns.	Popula- tion.	Distance from	
					Cincinnati.	Washington.
Brought forward	764,727	31,032				
Ross.....	24,053	672	Chillicothe.....	2,846	45	404
Sandusky.....	2,851	656	Lower Sandusky.....	351	103	428
Scioto.....	8,730	581	Portsmouth.....	1,064	91	421
Seneca.....	5,148	546	Tiffin.....	248	85	431
Shelby.....	3,671	418	Sydney.....	240	86	482
Stark.....	26,784	780	Canton.....	1,257	116	319
Trumbull.....	26,154	875	Warren.....	510	157	297
Tuscarawas.....	14,298	654	New Philadelphia.....	410	107	314
Union.....	3,192	430	Marysville.....	142	37	433
Van Wert.....	49	432	Willshire.....	...	146	533
Warren.....	21,493	400	Lebanon.....	1,157	83	468
Washington.....	11,731	670	Marietta.....	1,207	106	304
Wayne.....	23,344	660	Wooster.....	977	86	347
Williams.....	377	600	Defiance.....	52	175	511
Wood.....	1,095	744	Perrysburgh.....	182	135	460
Total.....	937,679	40,150				

The increase of population in the state of Ohio has been rapid almost beyond example. In the year 1790 it was only about 3000; in 1800, 45,365; in 1810, 230,760; in 1820, 581,434; and in 1830, 937,679.

For an account of Cincinnati, the principal city of Ohio, see the article CINCINNATI. Columbus, the political metropolis, is situated near the centre of the state, upon the east bank of the Scioto River. The beautiful slope on which it stands, just below the confluence of the Whetstone River with the Scioto, was a compact forest in 1812. It is now cleared and well cultivated, and the city contains some excellent public buildings, including a penitentiary, an asylum for the deaf and dumb, and above three thousand inhabitants. Steubenville, the seat of justice for Jefferson county, is situated on the western bank of the Ohio, near the Pennsylvania boundary. It was laid out with great regularity in 1798, and is situated in the centre of a rich and populous country. It has the usual number of public buildings found in towns of the same size, and it possesses cotton, woollen, and other manufactures. Chillicothe is finely situated upon a level alluvial plain on the west bank of the Scioto, forty-five miles in a right line from its entrance into the Ohio. It was laid out with great regularity in 1796, and contains some handsome buildings. It possesses several cotton factories, and a number of flour and other mills. Marietta, the oldest town in the state, is situated on the Ohio, a little above the mouth of the Muskingum River. Ships were formerly built here, but this business has been discontinued, and the town, although very advantageously placed, has not prospered like many others in the state less favourably situated. Sixty miles north of Marietta, on the Muskingum, is the town of Zanesville, principally distinguished for its manufactures of iron. Here there are likewise a number of flour and other mills, driven by the waters of the Muskingum; and two or three glass-houses. Cleveland, situated upon the southern shore of Lake Erie, at the mouth of Cuyahoga River, is destined, from its position, to become an important town. It is one of the principal points for embarkation on the lake, and during the last American war was a provision dépôt, and a place where many boats and other lake craft were built. Cleveland is intermediate between Buffalo and Cincinnati, and is the dépôt of that vast quantity of merchandise which is destined for the east and west. One of the most important places on Lake Erie is Sandusky, situated on the southern shore of a bay of the same name. Although it is comparatively a young settlement, it has a great number

of stores, and is one of the chief points of landing and embarkation between the Mississippi Valley and New York, Buffalo, and Detroit. The other ports or harbours on Lake Erie are Put-in Bay, Maumee Bay, Fair Port, and Ashtabula Creek. The relative importance of these, as well as the other towns belonging to Ohio, will be seen from our tabular view of the counties and county towns.

The first permanent settlement in the state of Ohio was made at Marietta, on the 7th of April 1788, by forty-seven persons from Massachusetts, Rhode Island, and Connecticut. In the year following a settlement was made at Columbia, six miles above Cincinnati, by a company principally from Pennsylvania. In September 1799, the first territorial legislature assembled at Cincinnati, under the ordinance of congress of the 13th July 1786, for the government of the territory of the United States north-west of the river Ohio. On the 30th of April 1802, congress passed an act authorizing the calling of a convention to form a state constitution for that part of the North-west Territory which now constitutes the state of Ohio. On the 1st of November following the convention met at Chillicothe, and formed the present constitution, by which Ohio was admitted into the union. The following is an outline of the constitution of Ohio. The legislative power is vested in a senate and house of representatives, which together are styled the General Assembly of the State of Ohio. The representatives are elected annually on the second Tuesday in October; and they are apportioned amongst the counties according to the number of white male inhabitants above twenty-one years of age. Their numbers cannot be less than thirty-six, nor more than seventy-two. The senators are chosen biennially, and are apportioned according to the number of white male inhabitants of twenty-one years of age. Their number cannot be less than one third, nor more than one half of the number of representatives. The executive power is vested in a governor, who is elected by the people for two years, on the second Tuesday in October; and his term of service commences on the first Monday in December. The general assembly meets annually at Columbus, on the first Monday in December. The right of suffrage is granted to all white male inhabitants above the age of twenty-one years, who have resided in the state one year next preceding the election, and who have paid or are charged with a state or county tax. The judicial power is vested in a supreme court, in courts of common pleas for each county, and such other courts as the legislature may from time to time establish.

Ohio. The judges are elected by a joint ballot of both houses of the general assembly, for the term of seven years. (R. R. R.)

OHIO, a great river of the valley of the Mississippi, in North America, formed by the confluence of the Alleghany and Monongahela Rivers at Pittsburgh, in the western part of Pennsylvania. The highest sources of the Alleghany are in Potter county, Pennsylvania, twelve miles to the eastward of Condersport, where they interlock with the head waters of the Genessee River, and the eastern and western branches of the Susquehannah. During its course through Pennsylvania, which is exceedingly irregular, it is joined by several streams, the most considerable of which are, Toby's Creek, extending one hundred miles into the interior of Pennsylvania, and the Kiskiminitas, formed by the junction of the Conemaugh and Loyalhanna, which rise near the Alleghany Mountains, one hundred miles distant. This branch of the Ohio, although its volume is not apparently wider than the other, is by far the most important tributary. It has a swift, sweeping, and rapid current, and often a rocky bottom, whence huge blocks rise to the surface of the water. In the spring time, when it is full, flat and keel boats descend it rapidly, without any danger. It has been navigated by steam-boats, but has been found one of the most difficult currents to stem ever attempted by these vessels. Monongahela River, the other fork of the Ohio, rises in Virginia, about seventy miles north-west of Morgantown. It traverses a rich and well-settled country, celebrated for its whisky, flour, and iron manufactures. The banks are often bold and high bluffs, and in some places the country is hilly. In good stages of the water, it is boatable by large boats for about one hundred miles from its mouth. During its course it receives the waters of a number of tributary streams, the most important of which is the Youghiogeny River, or, as it is commonly called, the Yough, which rises near the upper waters of the Potomac, the rivers being only separated by a spur of the mountains. From the western declivity of these mountains, both this and the main river receive a great accession of mountain streams. The united current, which has now become broad and majestic, flows in a north-west course to Pittsburgh, and where it unites with the Alleghany it is more than four hundred yards in breadth. At the confluence of the two great branches, the Ohio is somewhat more than six hundred yards wide, and it immediately assumes that broad, placid, and beautiful aspect which it maintains to its junction with the Mississippi, in latitude 37. 0. north, and longitude 88. 52. west. Its length from Pittsburgh to its mouth is about nine hundred miles, including the windings of the river; but the direct distance is only six hundred and fourteen miles. Its breadth varies exceedingly, being in some parts fourteen hundred yards, whilst in others it is only four hundred yards across. At Cincinnati it is about eight hundred yards wide, and this is nearly its average breadth. For thirty miles below Pittsburgh its course is north-west. It then turns slowly to the west-south-west, and pursues that general direction for some five hundred miles. It flows south-west for above one hundred and fifty miles, then westward above two hundred and fifty miles, and finally south-west about one hundred and seventy miles through that low and swampy country in which it joins the "Father of waters." Between Pittsburgh and its mouth it is diversified with about one hundred considerable islands, besides a great number of tow-heads and sand-bars, which in low stages of the water greatly impede navigation. Some of these islands are of exquisite beauty, and afford most lovely situations for retired farms. The passages between them and the sand-bars at their head are amongst the difficulties of the navigation of the river. Notwithstanding these obstacles, however, it is well adapted for boat navigation, the current being remarkably smooth and gentle, excepting

at Louisville in Kentucky, where it is broken by falls, the water running for several miles with great rapidity, although not so much so as to be insurmountable by boats. A canal round these falls, a work of great magnitude and utility, has been completed. The annual range of the Ohio, from low to high water, is about fifty feet; the extreme range is ten feet more. When lowest it may be forded at several places above Louisville. It is generally lowest in August, September, and October, and highest in December, March, May, and June. Throughout the year it is subject to sudden and very considerable elevations and depressions. Near Pittsburgh it is frequently frozen over for several weeks during the winter, and this has sometimes been the case four hundred miles lower down. Generally, the navigation upward is suspended by floating ice for eight or ten weeks in winter. When the river is at its mean height, its current is about three miles an hour; when higher and rising it is more, and when very low it does not exceed two miles an hour. Above two hundred steam-boats ply on the Ohio, a great part of which are employed in the commerce of the states bordering on the river; but they also connect with it the commerce of the states on the Mississippi. The produce of the contiguous states is readily transported to this channel by the numerous navigable rivers which it receives, and is thence conveyed to New Orleans, the grand commercial emporium of the valley of the Mississippi. The Ohio and all its tributaries cannot, it is believed, have less than five thousand miles of boatable waters; and, taking all circumstances into account, few rivers in the world can vie with it, either in utility or beauty. From its very commencement it affords most delightful prospects. Rivers of a romantic and beautiful character flow into it almost at equal distances, like lateral canals. Its valleys are of extraordinary depth and fertility; generally high and dry, and for the most part healthy; whilst the configuration of the country on the banks has much grandeur, softness, and variety. Of the rivers and creeks which join the Ohio, the number is very great. The following are all navigable, in moderate or high stages of the water, by steam-boats, for considerable distances, viz. the Muskingum, Great Kenhawa, Big Sandy, Scioto, Great Miami, Kentucky, Green, Wabash, Cumberland, and Tennessee. The last is by far the largest and most important tributary of the Ohio, watering considerable portions of Alabama, Tennessee, and Kentucky. Of creeks and smaller rivers there are probably nearly two hundred which enter the Ohio; but a list of them would only be a dry catalogue of uncouth names. (R. R. R.)

OHITTAHOO, one of the Marquis of Mendoza's Islands, in the Southern Pacific Ocean. It is about nine miles in length and twenty-one in circumference, and is intersected by a narrow ridge of hills, which are divided by deep, narrow, and fertile valleys, well watered, and adorned with trees. This, with other three islands which lie near it, was discovered in July 1595, by Alvaro Mendana, who gave them their name, in honour of the viceroy of Peru. A cove in which the European vessels usually anchored is situated in long. 139. 8. W. and lat. 9. 55. S.

OHRDRUFF, a city of the duchy of Saxe-Gotha-Altenburg, in Germany, the capital of a bailiwick of the same name, which, besides the city, contains six villages, 1700 houses, and 7000 inhabitants. It belongs to Prince Hohenlohe-Neuenstein. The city stands near the borders of the Thuringian Mountains, on the small river Ohre. It is surrounded with walls, and has a palace for the prince, four churches, a lyceum, an hospital, 840 dwellings, and 3480 inhabitants, who are industrious in making wood ware, in tanning leather, and in producing paper, copper utensils, and several smaller articles.

OIA, a river of Asiatic Russia, which falls into the Gulf of Obskaia. Long. 72. 24. E. Lat. 68. N.

Ohittahoo
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Oia.

Oil
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Okhotzk.

OIL, an unctuous and inflammable substance, obtained from several natural bodies, as animal and vegetable substances.

OISE, a department of the north of France, formed out of the ancient Isle of France, and the districts of Beauvaisis and Valois. It extends in north latitude from 49. 7. to 49. 38. and in east longitude from 1. 28. to 3. 4. It is bounded on the north by the Somme, on the east by the Aisne, on the south by the Seine and Marne and the Seine and Oise, and on the west by the Eure; and it is divided into four arrondissements, which are subdivided into thirty-five cantons and 738 communes. It extends over 2428 square miles, and, according to the census of 1836, contains 398,641 inhabitants, and elects three deputies to the national representative body. The face of the country is plain or undulating, with a chain of calcareous hills of moderate height, of which Mount Cæsar on the eastern part is the highest. The soil is various, being in some parts clayey and in others sandy with marl, and generally a calcareous subsoil, except in the marshy portions near the streams. The Oise runs through it till it falls into the Seine, and it is navigable for barges. The Aisne, another navigable river, passes through a part of this department before it joins the Oise. There are a great number of smaller streams, some with and some without a name, all of which reach the sea ultimately through the Seine. The climate is dry and healthy, except in the marshy parts and near the woods, which cover about one seventh part of the whole surface. The agriculture is tolerably conducted; but the paucity of manure causes a great part of the land to be left fallow; yet it yields more corn than is required for the consumption, and in average years can spare one fourth of its growth for the supply of the surrounding departments. Besides corn, it yields a vast quantity of fruit, especially cherries, which can be conveyed by the rivers to Paris and other large cities. A great quantity of apples is converted into cider. The vines in general produce only a weak wine, not capable of being long preserved, except some of Ancerville and of Villars-Saint-Sepulcre, which are preferred to all the others of Picardy. The breeding of horses is carefully attended to, and some excellent ones are reared. The stock of oxen and sheep is low for the extent of country; but the races of the latter have been recently improved by the crossings with Merinos, and some fine wool is now furnished to the manufacturers. There are fabrics of linen, woollen, and cotton goods in several places; a considerable quantity of thread lace is made by the females; and there are also many tanneries and potteries. There is a considerable transit trade on the rivers, and they, as well as the rivulets, afford much fish.

OKEHAM, or **OKHAM**, a market-town, the capital of the county of Rutland, and situated in a rich valley called the vale of Cadmus. It is ninety-five miles from London, and has a good market on Saturday. It has an ancient castle, now converted into an assize-hall and a county jail. The parish church, dedicated to All-Saints, is a fine old structure, with a lofty spire, which is visible a great way around it. It has no corporation; but whatever power of a municipal nature is exercised is derived from the Earl of Winchelsea or the Dean of Westminster, who are lords of the two manors into which the town is divided. Near to it is Burleigh-on-the-Hill, a noble mansion of the Earl of Winchelsea. The population amounted in 1801 to 1613, in 1811 to 1719, in 1821 to 2160, and in 1831 to 2440.

OKHOTZK, one of the four circles of Asiatic Russia, in the government of Irkoutsk. It extends along the gulfs of the Eastern Ocean, called the Seas of Okhotzk, of Kamtschatka, and of Anadir. The climate is damp and unhealthy, being exposed to thick mists, from so great an extent of ocean; and the country is not only barren, but unwholesome. This damp and poisonous atmosphere conti-

nues for ten miles inland, when the sea air is arrested by a ridge of moderately-elevated hills. Beyond this boundary the country is more fertile, as trees are found to grow well, and rich meadows are seen.

The town of Okhotzk is built upon a long and narrow ridge, enclosed between the sea and the river Okhota, and formed chiefly from an accumulation of marine débris. This town consists of 130 houses, extending in a line of about two thirds of a mile, though it is not more than from 100 to 300 feet broad. It has a church, some magazines, and a double row of shops. Okhotzk is the channel of trade between Irkoutsk and Kamtschatka. The goods are conveyed chiefly by water, there being a very short interval of land carriage. But it is a tedious and difficult voyage, and even dangerous from the barbarous nature of the people who inhabit the banks of the rivers. The land journey is likewise dangerous. So difficult is the country, that the goods can be carried only on pack-horses, or on men's backs, as there are no waggons of any description; and, on account of the danger of sinking in morasses, it can be performed only in the spring. The inhabitants of the town consist chiefly of mariners and Cossacks. Besides the officers of the court of justice, there are two priests. Long. of the town 142. 44. E. Lat. 59. 20. N. The Sea of Okhotzk is a large gulf of the Eastern Ocean, enclosed between Kamtschatka, the circle of Okhotzk, part of Chinese Tartary, and Saghalien. At its mouth are the Kurile Islands and part of Jesso.

OKIRAH, a town of Bengal, in the district of Burdwan, 105 miles north-west from Calcutta. Long. 87. 15. E. Lat. 23. 38. N.

OLANGO, a small island amongst the Philippines, near the eastern coast of Siba. Long. 123. 51. E. Lat. 10. 33. N.

OLCHANSKAIA, a fortress of Asiatic Russia, in the government of Orenburg, and situated on the small river Olchanka. It contains a church and several streets, and forms part of the military line of Samara. The inhabitants consist chiefly of veteran soldiers. It is 177 miles south-east of Orenburg.

OLDCASTLE, **SIR JOHN**, commonly called the Good Lord Cobham, was born in the reign of Edward III. He obtained his peerage by marrying the heiress of that Lord Cobham who had strenuously opposed the tyranny of Richard II.; and, with the estate and title of his father-in-law, he seems to have acquired the patriotic and independent spirit for which that nobleman was distinguished. By his means, the statute against provisors was revived, and guarded with more severe penalties than ever; and he was also one of the leaders of the party who, having drawn up a number of articles against the corruptions which then prevailed amongst ecclesiastics, presented them in the form of a remonstrance to the Commons. He was at great pains in collecting and transcribing the works of Wickliffe, which he dispersed amongst the people; and he sent a number of his disciples as itinerant preachers into various parts of the country. In the reign of Henry IV. he commanded an English army in France, at that time distracted by the contentions of the two factions of Orleans and Burgundy; and, in this capacity, he compelled the Duke of Orleans to raise the siege of Paris. In the reign of Henry V. he was accused of heresy, the growth and extension of which was mainly attributed to his influence. The king having a favour for Lord Cobham, who held a domestic office at court, delayed the prosecution, and kindly undertook, by reasoning and expostulation, to reclaim him from his errors. But the attempt proved abortive. "Next to God," said his lordship, "I profess obedience to my king; but as to the spiritual dominion of the pope, I could never see upon what foundation it is claimed, nor can I pay him any obedience;" and he added, "It is as sure as God's word is true, he is the great Antichrist foretold in holy writ." This answer,

Okirah
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Oldcastle.

Oldenburg, so different from what had been expected, deeply offended the king, who, turning away in visible displeasure, withdrew his favour from Cobham, and left him to the censures of the church, which speedily overtook him. Being summoned to appear before the archbishop, he disobeyed the citation, and was excommunicated on the ground of contumacy. Reckless in exposing himself to danger, he seems to have wanted the courage to confront it boldly when it appeared in a definite shape. Hoping to avoid the impending storm, he waited upon the king with a confession of his faith in writing; but whilst he was in the royal presence, an officer of the ecclesiastical court entered, and cited him to appear before the archbishop, upon which he was immediately conveyed a prisoner to the Tower. When brought before the proper tribunal, he read his opinion of the several articles in regard to which he supposed that he had been called in question, particularly the eucharist, images, penance, and pilgrimages; but he was informed, that in some things he had not been sufficiently explicit in stating his particular views; that on all these points the church had already decided, and by her determinations all Christians ought to abide; that these determinations would be given him as a direction of his faith; and that, in a few days, he must appear again and state his opinions. The second examination, however, ended like the first. Cobham declared that "he knew none holier than Christ and his apostles; and that these determinations were surely none of theirs, as they were against Scripture." He was accordingly condemned as a heretic, and remanded to the Tower; but he contrived to effect his escape from prison, and lay concealed in Wales, until information reached the king at Eltham that about twenty thousand Lollards had assembled for his destruction at St Giles, with Lord Cobham at their head. A bill of attainder then passed against him, a price was set upon his head, and a perpetual exemption from taxes promised to any town which should secure him. After having spent four years in Wales, he was at length seized, carried to London, and executed in St Giles's Fields, in December 1417, with circumstances of cruelty characteristic of the times.

As a writer, Lord Cobham is only known by a piece entitled "Twelve Conclusions, addressed to the Parliament of England," at the end of the first book of which are some monkish rhymes in Latin, which Bale has preserved. "A Breve Chronycle concerning the Examynacyon and Death of the blessed martyr of Christ, Syr Johan Oldecastell, the Lorde Cobham," was also published by Bale, and reprinted under the care of a Mr Lewis of Margate in 1729. Since that time the life of Lord Cobham has been written by Mr Gilpin, who describes him as a person of uncommon parts and varied talents, well qualified either for the cabinet or the field; as possessing acquirements equal to his parts; and, besides, as remarkable for his ready and poignant wit in conversation. "It was his thirst of knowledge," adds his biographer, "which first brought him acquainted with the opinions of Wickliffe. The novelty of them engaged his curiosity. He examined them as a philosopher, and in the course of his examination became a Christian." (A.)

OLDENBURG, a sovereign duchy in the north-east of Germany, but consisting also of two other portions separated from it, though both of them are of small extent. One of these smaller divisions in the north is called the principality of Lubeck, consisting of a small territory surrounded by the Danish territory of Holstein, and some small spots on the banks of the Trave, and near Schwartau, adjoining to the territory of the republic of Lubeck. The other of these small divisions is on the western side of the Rhine; it is called the principality of Birkenfeld, and is wholly surrounded by the Prussian province of the Lower Rhine. The whole of these three divisions extend over 2721 square miles, and comprehend nine cities, ten mar-

ket-towns, and 776 villages and hamlets, with 233,400 inhabitants, of whom 161,420 adhere to the Lutheran church, 68,000 are Catholics, and the remainder, excepting 900 Jews, are Calvinists. The population of the principality of Lubeck is 19,070, that of Birkenfeld is 21,180, and the remainder is found in Oldenburg proper. The revenues of the state amount to about L.130,000 annually, arising partly from tolls on the Weser, and partly from taxes on foreign goods, but chiefly from domains. The state has no debt. The army consists of 1650 men; but the state is bound to contribute to the force of the German confederacy a contingent of 2177 men. The principal river is the Weser, into which the smaller streams flow, and it is the ordinary channel of marine commerce. The soil is in general poor and sandy, but near to the rivers there are some rich marshes, obtained by draining and embankments, which fatten cattle, and afford the productions of the dairy. The cultivation is badly conducted in the large division. There are a great number of small proprietors, who cultivate their own fields, and thereby procure a bare subsistence. The climate is raw, cold, and exceedingly variable.

OLDENBURG, a city, the capital of the duchy of the same name in the north-east of Germany. It is situated on the river Hunte, which is navigable to the Weser, and is surrounded with walls planted with lime trees, being well built and clean, but in an antique style. The duke has a large and old, but not an elegant palace, on the grand parade, adjoining to the city. The city contains two churches, two hospitals, and 660 houses, with 5420 inhabitants, who subsist chiefly from the expenditure of the court, of the tribunals, and of the civil officers of the government. It has little trade excepting at its two great fairs. Long. 8. 6. 1. E. Lat. 53. 8. 33. N.

OLDENBURG, Henry, was born in the duchy of Bremen, in Lower Saxony. During the long parliament, he was appointed consul for his countrymen, at London, after the usurpation of Cromwell; but being discharged of that employment, he was appointed tutor to the Lord Henry O'Bryan, an Irish nobleman, whom he attended to the university of Oxford, where he was admitted to study in the Bodleian Library in the beginning of the year 1656. He was afterwards tutor to William Lord Cavendish, and was acquainted with Milton the poet. During his residence at Oxford he became acquainted with the members of that body, which there gave birth to the Royal Society, upon the foundation of which he was elected a fellow; and when the society had found it necessary to have two secretaries, he was chosen as assistant secretary to Dr Wilkins. He applied himself with extraordinary diligence to the business of his office, and in the year 1664 began the publication of the *Philosophical Transactions*, which he continued to publish to No. xxxvi. 25th June 1677. After this the publication was discontinued till the January following, when it was again resumed by his successor in the office of secretary, Mr Nehemiah Grew, who carried it on till the end of February 1678. Mr Oldenburg died at his house at Charleton, near Greenwich, in Kent, in August 1678.

OLDHAM, one of those towns which, within the present generation, have grown up with rapidity since the establishment of the cotton manufacture. It is situated in the hundred of Salford, in the county of Lancaster, eight miles from Manchester, and 186 from London. It stands on the river Medlock, very near the source of that and of another stream called the Irk, in a district abounding in coal. Oldham had been created into a market-town; and was by the reform act constituted a borough, with the power of returning two members to the House of Commons. It is parochially united with Prestwick, and these places comprehend ten townships, extending over 21,160 acres, with a population, in 1831, of 67,579 persons. The whole is a

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manufacturing district, making fustians and spinning cotton yarn, and also having a great trade in making hats. The town of Oldham is, for the most part, of very recent erection, containing many large piles of buildings destined for manufacturing purposes, and a proportional number of small dwellings for the workmen; but all are discoloured by the smoke which issues from numerous steam-engines, few of the proprietors of which reside within the town. It has a fine large parish church, and, as is usual with such a population, a very great variety of places of worship for the several discordant and dissenting sects. At the first election for this borough, it was distinguished by its selection of Mr Cobbett as one of its representatives. The population of the township of Oldham amounted in the year 1801 to 12,024, in 1811 to 16,690, in 1821 to 21,662, and in 1831 to 32,381.

OLDHAM, *John*, an eminent English poet of the seventeenth century, was educated under his father, a nonconformist minister, and then sent to Edmund Hall in Oxford. He afterwards became usher to the free school at Croydon in Surrey, where he received a visit from the Earls of Rochester and Dorset, Sir Charles Sedley, and other persons of distinction, merely on account of some verses of his which they had seen in manuscript. He was successively tutor to the sons of several gentlemen; and having saved a small sum of money, he came to London, where, being an agreeable companion, he became a perfect votary to the bottle. He was quickly found out by the noblemen who had visited him at Croydon, and who made him acquainted with Dryden. He lived mostly with the Earl of Kingston, at Holme Pierr-point, in Nottinghamshire, where he died of the smallpox in 1683, in the thirtieth year of his age. His acquaintance with learned authors appears, by his satires against the Jesuits, to have been considerable; and Dryden esteemed him highly. His works, which are printed in two vols. 12mo, consist chiefly of satires, odes, translations, paraphrases of Horace and other authors, elegiac verses, imitations, parodies, and familiar epistles.

OLDMIXON, *JOHN*, a violent party-writer and ill-natured critic, who would scarcely have been remembered, if Pope, in resentment of his abuse, had not condemned him to immortality in the *Dunciad*. His party-writings procured him a place in the revenue at Liverpool, where he died at an advanced age, in the year 1745. Besides his fugitive pieces, he wrote a *History of the Stuarts*, in folio; a *Critical History of England*, in two vols. 8vo; a volume of *Poems*; and some dramatic pieces.

OLEKMA, a river of Asiatic Russia, in the government of Irkoutsk, and a tributary of the Lena. Its course is from south to north, and is in length nearly 600 miles. The animal which produced the sable fur formerly haunted its banks, but it has now disappeared.

OLEKMINSK, a fort and small town of Asiatic Russia, in the government of Irkoutsk. It was originally erected as a station for collecting the tribute of furs from the Yakoutes, who wander in the neighbouring districts. It has some twenty houses and a church, and is situated about nine miles from the mouth of the Olekma. It is 692 miles north-east of Irkoutsk.

OLENEK, a considerable river of the government of Irkoutsk, in Asiatic Russia, which discharges itself into the Frozen Ocean. Long. 119. E. Lat. 73. N. The small town of Olenok is situated near the mouth of the Olenek.

OLENUS, a Greek poet, older than Orpheus, who was a native of Xanthe, a city of Lycia. He composed several hymns, which were sung in the island of Delos upon festival days. Olenus is said to have been one of the founders of the oracle at Delphi; to have been the first who at that place filled the office of priest of Apollo; and to have given responses in verse.

OLERON, an arrondissement of the department of the

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Ollerton.

Lower Pyrenees, in France, being 972 square miles in extent. It comprehends eight cantons, which are divided into eighty-one communes, and it contains 71,400 inhabitants. The capital is the city of the same name, situated between the two rivers Gaves d'Aspe and Gaves d'Ossau. It contains 900 houses, and 6400 inhabitants, who are employed in making thin woollen hosiery and leather. Long. 0. 17. W. Lat. 43. 10. N.

OLERON, an island situated on the coast of France, in the department of the Lower Charente. It is about ninety square miles in extent, and is opposite the mouths of the rivers Charente and Seudre. It is separated from the mainland by the strait called the Pertuis de Maubuisson. Oleron is a fertile spot, especially on the east and south parts, and yields good corn, wine, and brandy. There are also extensive marshes, from which salt is collected. It contains about 15,000 inhabitants, who are expert seamen and fishermen.

OLIGARCHY, a form of government in which the administration of affairs is confined to a few hands.

OLIO, or OGLIO, a savoury dish, or food, composed of a great variety of ingredients.

OLIVAREZ, *DON GASPARD DE GUZMAN CONDE DE*, the favourite and minister of Philip IV. of Spain, a man of great parts and boundless ambition. After a restless and unprincipled career, he was banished to Toro, where he died about the year 1645.

OLIVE'S ISLAND, a small island lying off the south coast of New Holland, and belonging to the Nuyts Archipelago. Long. 133. 53. E. Lat. 32. 46. S.

OLIVET, or MOUNT OF OLIVES, was situated to the east of the city of Jerusalem, and separated from the city only by the brook Kedron, and by the valley of Jehoshaphat, which stretches out from the north to the south.

OLIVETAN, *ROBERT*, a son of John Calvin. He printed, at Neufchatel, in 1535, folio, a version of the Bible into French, which had been translated from the original Hebrew and Greek. It is written in an uncouth and barbarous style, and is very far from being faithful. The characters in which it is printed are Gothic, and the language is scarcely less so. It is valued only because it is rare. Calvin is believed to have had a considerable share in this translation. Olivetan survived his publication only a short time. He died at Rome the year after, having, it is alleged, been poisoned on account of his translation. Olivetan's Bible, revised by Calvin and Malinger, was reprinted at Geneva, in 1540, in 4to. This edition is still rarer than the former. It is called the *Bible de l'Epée*, because the printer had adopted the figure of a sword as his ensign.

OLIVIER, *CLAUDE MATTHIEU*, advocate of the parliament of Aix, was born at Marseilles, in 1701. He had a principal share in the establishment of the academy of Marseilles, and was one of its original members. He practised at the bar with considerable success; and a few hours' retirement from society and from his pleasures were frequently sufficient to enable him to speak and write, even upon important causes. But his works commonly bore marks of great haste. Addicted to excess in every thing, he would employ a fortnight in studying the Code and the Digest, or in storing his mind with the beauties of Demosthenes, Homer, Cicero, and Bossuet; and would then abandon himself for another fortnight, frequently for a whole month, to a life of frivolity and dissipation. He died in 1736, at the age of thirty-five. Olivier published, 1. *L'Histoire de Philippe Roi de Macedoine, et Père d'Alexandre le Grand*, 2 vols. 12mo; 2. *Mémoire sur les Secours donnés aux Romains par les Marseillois pendant la Seconde Guerre Punique*; 3. *Mémoire sur les Secours donnés aux Romains par les Marseillois durant la Guerre contre les Gaulois*.

OLLERTON, a small market-town of the county of Nottingham, in the hundred of Bassetlaw, a part of the parish

Olmütz of Edwinston, of which it is a chapelry. It is 133 miles from London, and thirteen from Nottingham, and has a market, which is held on Friday. The population amounted in 1801 to 439, in 1811 to 462, in 1821 to 576, and in 1831 to 658.

OLMUTZ, a city of the Austrian province of Moravia, the capital of a circle of the same name, which extends over 2090 square miles, and comprehends twenty-seven cities, twenty market-towns, and 795 villages, with 410,000 inhabitants. It is for the most part a mountainous country, and the principal rivers of the province have their sources in it. The southern part is the least hilly, and is a very fertile and well-cultivated district. The city, which stands on the river March, is fortified, and defended by a citadel, in which Lafayette was long a prisoner. It is a well-built place, being the see of an archbishop, and the seat of the administration of the province; and it has a lyceum, with a good library, twenty-six professors, and about 800 students, who are admitted to graduate in the four faculties of law, philosophy, medicine, and theology. It contains 680 houses, and, besides the military, about 12,000 inhabitants. It has little trade, and none but small manufactories. Long. 14. 4. 45. E. Lat. 49. 32. 43. N.

OLNEY, a market-town in the hundred of Newport, in the county of Buckingham, fifty-six miles from London. It is built on the river Ouse, and consists chiefly of one long street. The only distinguished object is the parish church, a spacious building, with a spire 185 feet in height, being the most lofty of any in the county. There was formerly considerable occupation here for females in making bone lace; but it has nearly ceased, and been feebly replaced by making straw-plaiting for hats. This place was the residence of the poet Cowper, who drew much of his descriptions from the scenery around the town. There is a market on Monday, but it has much declined. The population amounted in 1801 to 2075, in 1811 to 2268, in 1821 to 2339, and in 1831 to 2418.

OLONEZ, a government or stadtholderate of Russia, so called from the city of the same name, and also the river which empties itself into the Lake of Ladoga. It extends in north latitude from 60. 29. to 66. 30., and in east longitude from 29. 45. to 41. 37., and has a superficies of 83,314 square miles. It is very thinly peopled, containing not more than 350,000 inhabitants. The southern part of the province is level, and abounds in lakes and morasses, including in the former the large Lake of Ladoga. In the northern part a portion of the Scandinavian range of mountains enters from Sweden and Norway. The soil is generally sterile, and the climate ungenial; but the former produces some rye, barley, and oats, though the harvests rarely afford four times the quantity of seed that is sown. The most important products, besides grain, are derived from the forests, which are extensive, and, besides fuel, supply timber for building, as well as tar and pitch. There are some few mines of iron worked, and the quarries yield marble and other kinds of stone, enormous blocks of which are conveyed to St Petersburg for building. The province is divided into eight circles, which contain eight cities and 227 parishes.

OLOT, a large town in the north-east of Spain, in the province of Catalonia and district of Vique. It is situated on the river Fluvia, about twenty miles to the north-west of the city of Gerona, so celebrated for its gallant defence against the French. It is surrounded with walls, is tolerably well built, with several squares, and contains three parochial and two conventual churches, besides a large hospital. In the town there are 3000 houses, and about 15,000 inhabitants, and it is one of the most industrious places in the kingdom. It is particularly distinguished by its manufactures of silk goods, and of cotton and woollen stockings. It has, too, several establishments for making serges and

corduroys, as well as coarser woollens; some mills for spinning cotton, several tanneries, some printed cotton works, several soap-making manufactories, and a large manufactory of cards. It also has a considerable trade in cork and in wool. Notwithstanding it has suffered severely by the loss of the trade to South America, and by the internal political dissensions, it has made considerable progress in all branches of industry.

OLPAR, a town of Hindustan, in the province of Gujerat, and district of Broach, seven miles north from Surat. Long. 73. 1. E. Lat. 21. 18. N. It is also a small district, which was settled as a private estate on the peishwa, by the Mahratta treaty of 1803, but was afterwards taken from him on account of his treacherous conduct.

OLUTORA, a river of Asiatic Russia, which falls into the Eastern Ocean near the peninsula of Kamtschatka. A fort has been constructed by the Russians on its bank, but this has been twice destroyed by the Koriaks, a singular race, who take the whale in nets formed of thick ropes.

OLYMPIA, in *Ancient Geography*, was surnamed Pisatis, and so called from the territory of Pisa, in Elis. According to Strabo, there was here the temple of Jupiter Olympius, before which stood a grove of wild olive trees, in which was the stadium or foot-course, so called because it was the eighth part of a mile; and by it runs the Alpheus, which comes down from Arcadia. Olympia, however, was famous not merely for the temple of Jupiter, but also for a temple of Juno, sixty-three feet in length, with columns of the Doric order round it; and a metroon, or temple of the mother of the gods, a large Doric edifice, with holy treasuries. These, and the porticoes, gymnasium, prytaneum, and many more buildings, chiefly in the enclosure, with the houses of the priests and other inhabitants, rendered Olympia a place of no inconsiderable importance. The stadium was in the grove of wild olive trees, before the great temple; and near it was the hippodrome, or course for the races of horses and chariots. The Alpheus flowed by from Arcadia, in a copious and pleasant stream, which was received on the coast by the Sicilian Sea.

The temple of Jupiter was of the Doric order, sixty-eight feet in height to the pediment, ninety-five in width, and two hundred and thirty in length; the cell being encompassed with columns. It was erected with the stone of the country; but the roof was of Pentelican marble, the slabs being disposed as tiles, and the access to it was by a winding staircase. The two pediments were enriched with sculpture, one having over the centre a statue of Victory gilded, and underneath a votive buckler of gold. At each corner there was a gilded vase. Above the columns were fixed twenty-one gilded bucklers, offered at the conclusion of the Achæan war by the Roman general Mummius. The gates in the two fronts were of brass, and over them were carved the labours of Hercules. Within the cell were double colonnades, between which was the approach to the image.

The Jupiter of Olympia was accounted alone sufficient to immortalize its sculptor Phidias. It was of ivory and gold, and the head was crowned with olive. In the right hand was a statue of Victory; and in the left a flowered sceptre, composed of various metals, and on which was an eagle. The sandals were of gold, and the vestment was of the same material, being curiously embossed with lilies and animals. The throne was gold inlaid with ebony and ivory, and studded with jewels, intermixed with paintings and exquisite figures in relief. The pillars between the feet contributed to its support. Before it were walls, serving as a fence, and decorated principally with the exploits of Hercules; the portion opposite to the door was of a blue colour. A family descended from Phidias, and called *phædruntæ*, or *the polishers*, had the charge of keeping the work bright and clean. The veil or curtain was of cloth rich

Olpar
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Olympia.

Olympiad
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Olympic
Games.

with the purple dye of Phœnicia, and worked with Assyrian embroidery; an offering of King Antiochus, and which was let down from above by loosening the strings. The image impressed the spectator with an opinion that it was wider and higher than it actually measured. Its magnitude was such, that, though the temple was very large, the artist seemed to have erred in the proportions. The god, sitting, nearly touched the ceiling with his head, and thus suggested an idea that, if he were to rise up, he would destroy the roof. A part of the pavement before it was of black marble, enclosed in a rim of Parian or white marble, within which they poured oil to preserve the ivory.

The altar of Jupiter Olympius was of great antiquity, and composed of the ashes of the thighs of the victims, which were carried up and consumed on the top of it, along with wood of the white poplar tree. The ashes also of the prytaneum, in which a perpetual fire was kept burning on a hearth, were removed annually on a fixed day, and spread upon it, being first mingled with water from the Alpheus. The cement, it was affirmed, could be made of that fluid only, and therefore this river was much respected, and esteemed the most friendly of any to the god. On each side of the altar there were stone steps, and its height was about twenty-two feet. Women and girls, when allowed to visit Olympia, were suffered to ascend the basement, which was an hundred and twenty-five feet in circumference. The people of Elis sacrificed daily, and private persons as often as they chose. Olympia was situated upon an eminence, between two mountains called Ossa and Olympus.

OLYMPIAD, the space of four years, by which the Greeks reckoned time. According to the most accurate and learned computation of the moderns, the first Olympiad fell exactly 776 years before the first year of Christ, or 775 years anterior to his birth, in the year of the Julian period 3938, and twenty-two years before the building of the city of Rome. The games were exhibited at the time of the full moon next after the summer solstice; therefore the Olympiads were of unequal length, because the time of the full moon differs eleven days every year; for which reason they sometimes began the next day after the solstice, and at other times four weeks afterwards. The computation by Olympiads ceased, as some suppose, after the 304th, in the year 440 of the Christian era. It was universally adopted, not only by the Greeks, but by many of the neighbouring countries; though the Pythian games still served as an epoch to the people of Delphi and to the Bœotians, the Nemæan games to the Argives and Arcadians, and the Isthmian to the Corinthians and the inhabitants of the isthmus. To the Olympiads history has been greatly indebted. They have served to fix the time of many momentous events; and indeed before this method of computing time was observed, every page of history is mostly fabulous, being filled with such obscurity and contradiction, that no true chronological account can be properly established or maintained with certainty.

OLYMPIC GAMES were solemn games amongst the ancient Greeks, and so called from Olympian Jupiter, to whom they were dedicated. By some they are said to have been first instituted by him after his victory over the sons of Titan; whilst others ascribe their institution to Hercules (not the son of Alcmena, but one of much greater antiquity), others to Pelops, and others to Hercules the son of Alcmena. The festival, which lasted five days, began and ended with a sacrifice to Olympian Jupiter. The intermediate time was chiefly filled up by the gymnastic exercises, in which all freemen of Grecian extraction were invited to contend, provided they had been born in lawful wedlock, and had lived untainted by any infamous or immoral conduct. The preparation for this part of the entertainment was made in the gymnasium of Elis, a spacious edifice surrounded by a double range of pillars, with an open area in the

middle. Adjoining were various apartments, containing baths, and other conveniences for the combatants. The neighbouring country was gradually adorned with porticoes, shady walks, and groves, interspersed with seats and benches; the whole being originally destined to relieve the fatigues and anxiety of the candidates for Olympic fame, and frequented in later times by sophists and philosophers, who were fond to contemplate wisdom and communicate knowledge in those delightful retreats. The order of the athletic exercises, or combats, was established by Lycurgus, and corresponded almost exactly to that described by Homer in the twenty-third book of the Iliad, and the eighth of the Odyssey. Iphitus, we are told, appointed the other ceremonies and entertainments; settled the regular return of the festival at the end of every fourth year, in the month of July; and gave to the whole solemnity that form and arrangement which it preserved with but little variation for more than a thousand years; a period exceeding the duration of the most famous kingdoms and republics of antiquity. Amongst the benefactors of Olympia at a much later period was reckoned Herod, afterwards king of Judæa. On his way to Rome, seeing the games neglected or dwindling into insignificance, from the poverty of the Eleans, he displayed great munificence as president, and provided an ample revenue for their future support and dignity. Such an institution, even in its least perfect form, must have been attended with advantages to society. It is sufficient to mention the suspension of hostilities which took place, not only during the celebration of the festival, but for a considerable time both before and after it. Considered as a religious ceremony, to which the whole Grecian race was invited, and even enjoined to assist in its celebration, it was well adapted to facilitate intercourse, to promote knowledge, to soften prejudice, and to accelerate the progress of civilization. Greece, particularly Peloponnesus, was the centre from which the adventurous spirit of its inhabitants had diffused innumerable colonies throughout the surrounding nations. To these widely-separated communities, which, notwithstanding their common origin, seemed to have lost all connection and correspondence, the Olympiad served as a common bond of alliance and a point of re-union. The celebrity of this festival continually attracted to it the characters most distinguished for genius and enterprise, whose fame would have otherwise been unknown and lost in the extent of the Grecian territory. The remote inhabitants, not only of European Greece, but of Asia and Africa, being assembled at the worship of their common gods, were thus trained to the sense of a general interest, and excited to the pursuit of national honour and prosperity. Strangers of similar dispositions might confirm in Elis the sacred and indissoluble ties of hospitality. If their communities were endangered by any barbarous power, they might there solicit assistance from their Grecian brethren; and, upon other occasions, they might explain the benefits which, in peace or war, their respective countries were best qualified to communicate. And thus the Olympic festival might serve the purpose of resident ambassadors, and of other institutions alike unknown to antiquity.

OM, a considerable river of Tobolsk, in Asiatic Russia, which rises in a lake, and, after a western course of about 500 miles, falls into the Irtysh.

OMA, one of the Molucca Islands, about nine miles in length and six in width, containing about 5000 inhabitants.

OMAR EBN AL KHATTAB, the successor of Abu-Bekr. We are informed that Omar was miraculously converted to the Mahommedan faith. Before this event he is said to have been truly respectable, and in particular a violent opposer of the Arabian prophet. Mahommed, it seems, felt this opposition, and regretted it; he, therefore, with all the fervour, and, as it happened, with all the success of

Om
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Omar Ebn
al Khat-
tab.

Ombay
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Ombre.

a true prophet, as his followers pretend, prayed for the conversion of his dangerous antagonist. Omar is said to have no sooner read the twentieth chapter of the Koran than he was convinced; upon which he instantly repaired to Mahommed and his followers, and declared his conversion. On the death of Abu-Bekr, who had succeeded the impostor himself, he was promoted to the regal and pontifical dignity. The title first assigned him was the "caliph of the caliph of the apostle of God;" or in other words, "the successor of the successor of Mohammed;" but the Arabs, considering that this title, by the addition to be annexed to it at the accession of every future caliph, would be too long, they, by universal consent, saluted him "the emperor of the believers;" which illustrious title, conferred at this juncture upon Omar, descended afterwards to all the successors of that prince. He was assassinated by a Persian slave, who stabbed him in the mosque at Medina. This event took place in the twenty-third year of the Hegira, which began in the year of Christ 643. His extensive conquests rendered the Moslem empire one of the most powerful and formidable monarchies in the world.

OMBAY, an island in the Eastern Seas, forty-five miles in length and about thirteen in breadth. Its inhabitants are fierce and treacherous in their habits, so that it is dangerous for strangers to approach it. It is twenty miles west of Timor.

OMBRE, a well-known game at cards, borrowed from the Spaniards, and played by two, by three, or by five persons, but generally by three. When three play at this game, nine cards are dealt to each party; the whole ombre pack being only forty, because the eights, nines, and tens are thrown out of the pack. There are two sorts of counters for stakes, the greater and the lesser. The last has the same proportion to the other as a penny has to a shilling. Of the greater counters each man stakes one for the game; and one of the lesser for passing for the hand, when eldest, and for every card taken in. As to the order and value of the cards, the ace of spades, called *spadillo*, is always the highest trump, in whatsoever suite the trump be; the *manille*, or black deuce, is the second; and the *basto*, or ace of clubs, is always the third. The next in order is the king, the queen, the knave, the seven, the six, the five, four, and three. Of the black there are eleven trumps, and of the red, twelve. The least small cards of the red are always the best, and the most of the black, except the deuce and red seven, both of which are called the *manilles*, and are always second when the red is a trump. The red ace, when a trump, enters into the fourth place, and is called *punto*; otherwise it is only called an ace. The three principal cards are called *matadores*, and have this privilege, that they are not obliged to attend an inferior trump when it leads; but, for want of a small trump, the person may renounce small trumps, and play any other card; and when these are all in the same hand, the others pay three of the greatest counters a piece. With these three for a foundation, the player may count as many *matadores* as he has cards in an uninterrupted series of trumps; and for all these the others are to pay one counter a piece. He who has the first hand is called *ombre*, and has his choice of playing the game, of naming the trump, and of taking in as many or as few cards as he pleases; and after him the second, &c. But if he does not name the trump before he looks on the card which he has taken in, any other may prevent him, by naming what trump he pleases. He who has the first hand should neither take in nor play, unless he has at least three sure tricks in his hand; for, as he wins the game who wins most tricks, he that can win five of the nine has a sure game. This is also the case if he win four, and can so divide the tricks that one person may win two, and the other three.

If a person play without discarding or changing any

VOL. XVI.

of the cards, this is called playing *sans prendre*; and if another win more tricks than he, he is said to win *codille*. The oversights in the course of the game are called *beasts*; and if the ombre wins all the nine tricks, it is called winning the *vole*.

In ombre by five, which many, on account of its not requiring so close an attention, prefer to that by three, only eight cards a piece are dealt; and five tricks must be won, otherwise the ombre is beasted. Here the person who undertakes the game, after naming the trump, calls a king to his assistance; upon which the person in whose hand the king is, without discovering himself, is to assist him as a partner, and to share his fate. If, between both, they can make five tricks, the ombre wins two counters, and the auxiliary king only one; but when the counters are even, they divide them equally. If the ombre venture the game without calling in any king, this too is called playing *sans prendre*; in which case the other four are all against him, and he must win five tricks alone, or be beasted. The rest is much the same as by three.

OMBROMETER, an instrument to measure the quantity of rain that falls. It consists of a tin funnel, the surface of which is an inch square, with a flat board, and a glass tube set into the middle of it in a groove. The rise of the water in the tube, the capacity of which at different times must be measured and marked, shows the quantity of rain that has fallen.

OMEERSEER, a village of Hindustan, in the province of Cutch, about four miles south from Luckput Bunder. Lat. 23. 43. N.

OMELET, or OMELETTE, a kind of pancake or fricassée of eggs, with other ingredients, very common in Spain and in France.

OMEN is a word which, in its proper sense, signifies a sign or indication of some future event, taken from the language of a person speaking without any intention to prophecy. Hence Tully says that the Pythagoreans attend to the discourse, not only of gods, but also of men, which they call *omens*. This sort of omen was supposed to depend much upon the will of the person concerned in the event; and hence the phrases, *accepit omen*, *arripuit omen*. Such were the original omens; but they were afterwards derived from things as well as from words. Thus Paterculus, speaking of the head of Sulpicius on the rostrum, says it was *velut omen imminentis proscriptionis*, the omen of an impending proscription. Suetonius observes of Augustus, that he believed implicitly in certain omens; and that if his shoes were improperly put on in the morning, especially if the left shoe was put upon his right foot, he considered it as a bad omen. Omen was used, in a still larger sense, to signify an augury, as in the following line of Tully: "Sic aquilæ clarum firmavit Jupiter omen," thus Jove confirmed the bright omen of the eagle. Lastly, it was used, in the most generic sense of all, for a portent or prodigy; as in the third book of the *Æneid*, where a myrtle torn up by *Æneas* dropped blood.

The portentous or supernatural omens were either external or internal. Of the former kind were those showers of blood so frequently occurring in the Roman history, which were much of the same nature with this adventure of *Æneas*, which he calls *monstra deum*. Of the latter kind were those sudden consternations, which, seizing upon men without any visible cause, were imputed to the agency of the god Pan, and hence called *panic terrors*. But indeed there was hardly any thing, however trivial, from which the ancients did not draw omens. That it should have been thought a direful omen when any thing befell the temples, altars, or statues of the gods, need therefore excite no wonder; but that the meeting of an eunuch, a negro, a bitch with whelps, or a snake lying on the road, should have been looked upon as portending bad fortune,

Omer, St is a deplorable instance of human weakness, and of the pernicious influence of superstition on the mind.

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Ommon.

It is more than probable that this practice of making ordinary events ominous of good or bad fortune took its rise in Egypt, the parent land of almost every superstition; but wherever it may have arisen, it spread itself over the whole inhabited globe, and at this day prevails in a greater or less degree amongst the vulgar of all nations. The following may be cited as examples.

To break a looking-glass is extremely unlucky; the party to whom it belongs will lose his best friend. If, going a journey on business, a sow cross the road, you will probably meet with a disappointment, if not a bodily accident, before you return home. To avert this you must endeavour to prevent her crossing you; and if that cannot be done, you must ride round on fresh ground. If the sow be attended with her litter of pigs, it is lucky, and denotes a successful journey. It is unlucky to see first one magpie, and then more; but to see two denotes marriage or merriment; three, a successful journey; four, an unexpected piece of good news; and five, that you will shortly be in a great company. To kill a magpie will certainly be punished with some terrible misfortune. If in a family the youngest daughter should be married before her elder sisters, they must all dance at her wedding without shoes. This will counteract their ill luck, and procure them husbands. If you meet a funeral procession, or if one pass by you, always take off your hat. This keeps all the evil spirits attending the body in good humour. If, in eating, you miss your mouth, and the victuals fall, it is very unlucky, and denotes approaching sickness. It is lucky to put on a stocking the wrong side outwards; changing it alters the luck. When a person goes out to transact any important business, it is lucky to throw an old shoe after him. It is unlucky to present a knife, scissors, razor, or any sharp or cutting instrument, to one's mistress or friend, as they are apt to cut love and friendship. To avoid the evil effects of this, a pin, a farthing, or some trifling recompense, must be taken. To find a knife or razor denotes ill luck and disappointment to the party that finds it.

OMER, St, an arrondissement of the department of the Pas de Calais, in France. It extends over 403 square miles, and comprises seven cantons and 117 communes, with 105,020 inhabitants. The capital is the city of the same name, situated on the river Aa. It has walls, broad streets, and well-built houses, a cathedral, six churches, a college, and in the year 1836 contained 19,032 inhabitants. It is a place of considerable manufactures of woollens, and where, by means of a canal connecting it with the city of Calais, there is a great internal trade in agricultural productions. Long. 2. 9. 52. E. Lat. 50. 44. 52. N.

OMERCUNTUC, a district and town of Hindustan, in the province of Gundwana. It is a celebrated resort of Hindu pilgrimage. In the neighbourhood are found the sources of the three great rivers, the Soane, Nerbuddah, and the Mahanuddy, which adds to the sanctity of the place; the Hindus always evincing a great regard for the sources and the confluence of rivers. Long. of the town 82. 15. E. Lat. 22. 53. N.

OMERPOOR, a town of Hindustan, in the nizam's territories, in the province of Berar, eighty-two miles north-east from Julnapoor. Long. 77. 10. E. Lat. 20. 23. N.

OMMON, a district of Arabia, which comprises a portion of the southern coast extending from its eastern extremity of Rasalgate to the entrance of the Persian Gulf. In the interior it is one of the wildest parts of the country, and is little known, but is generally supposed to consist of sandy deserts. Along the coast the country is more fertile, and the inhabitants are an industrious and active race, pursuing with ardour both commerce and navigation. The soil is well watered by the rivers which flow from the

ranges of mountains along the coast. Its produce is confined almost exclusively to dates and a little wheat, which appears to be scarcely sufficient for its own consumption, as, according to Frazer (see Narrative of a Journey into Khorassan, p. 17), large quantities of the latter article are imported from Bushire and Bassora. On the other hand, large quantities of dates are also exported; those of Ommon enjoying, it is said, a preference over the produce of other places, particularly in Sinde, to which they are exported. Dates are the great staple of these countries, being the staff of life; and they are the standard by which the value of landed estates is estimated. Landed property, although it usually descends by inheritance, may be disposed of in any way the proprietor pleases. The sovereign's claim is confined to the tenth of the produce, and he can in no way interfere with the proprietor's rights, although he may divest him of any command which he possesses, or expel him from the district if he pleases. Lands are usually let out in lease, or annual rent payable in a portion of the produce. Slaves are made use of here, as throughout Arabia, in the labours of agriculture; but they are treated with kindness and indulgence. The property of the Arabs which they possess independently of land, consists for the most part in live stock, sheep, goats, camels, asses, a few horses, and cows; camels being in value from thirty to three hundred dollars a-piece, according to blood and quality. The asses of Ommon are celebrated as the finest of Arabia; and individuals of the best breed sell for very extravagant sums. The value of the common kind varies from one to forty dollars; goats from four to six dollars; sheep from one and a half to six dollars. No mules are reared, nor are horses abundant in the province. The cows have humps, and resemble those of India. Milk, butter, and ghee are very abundant, and good of their kinds; which is the more remarkable, as the cattle have little or no pasture in the neighbourhood, and are fed upon dried fish a little salted, of which they become very fond. Ommon is by no means celebrated for its manufactures, which consist of turbans and waistbands, or girdles of cotton and silk, striped or checked with blue, and having the ends ornamented with red, green, or yellow borders; cloaks, called abbas, made of sheep's wool or camel's hair, and of various degrees of fineness; cotton canvass, gunpowder, and arms of no superior quality; and earthen jars for the market of Zanguebar. They also prepare a sweetmeat in high esteem, called *hulwah*, from honey or sugar, the gluten of wheat and ghee, with a few almonds; and sharks' fins and dried salt-fish for the eastern markets. Frazer states, that the provinces of Arabia, of which Muscat is the first, are too poor to consume much foreign produce, or to afford any considerable quantity of their own in exchange. Still, he adds, there is a certain demand for many Indian productions and other articles, as rice, sugar, spices, cotton cloths, silk, indigo, ship timber, and coffee from Mocha, cowries, ivory, Joarree grain, gums, civet oil for burning, cocoa-nuts, wood for building, and slaves from Zanguebar and other African ports; dates, rose-water, &c. from Bushire and Bassora. A considerable quantity of these articles is sent to this country merely in transit, as it is a great entrepôt of the commerce which is carried on between India, Arabia, Persia, and Eastern Africa; but no inconsiderable portion is consumed in the country, and paid for chiefly in dollars and cowries; and he is at a loss to understand where this quantity of specie is procured. But it is obvious that the country can only procure it by the sale of its own produce. There is no other source from which it can be obtained; nor need a passing traveller be surprised that he cannot comprehend at a glance all the resources which an extensive district may possess for carrying on foreign trade. Where can any country find equivalents to exchange with foreigners for their produce

Ommon.

Omoa
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Omphale.

but within itself? The fact stated by Mr Frazer, of the abundance of specie given in exchange for foreign articles, speaks for itself. It is an index of the state of wealth; nor need it excite the smallest incredulity or surprise. The climate of Ommon is extremely unfavourable for European constitutions; scarcely any native of Europe ever resides here without experiencing its fatal effects. The heat is always great. Frazer mentions, that during his abode there, which was in July, the heat varied from 90° to 102° of Fahrenheit; the greatest inconvenience experienced was from the suffocating heat of the nights, as a parching wind blew from the rocks, preventing that cool freshness which the dewy morning brings in most countries, and keeping the frame so continually relaxed and unrefreshed by sleep, as to render it predisposed to the attacks of disease. The natives are the most expert navigators in these seas, and use a very singular species of craft, which are broad in proportion to their length, and are constructed of planks fastened together by nails, and tied and sewed together with cords. This country was early invaded by the Portuguese, who acquired possession of Muscat, its principal port, which they retained for nearly two centuries. Ommon was invaded and conquered, in the course of the last century, by Nadir Shah. But the native princes, when his armies were engaged in other quarters, took the opportunity of re-conquering their dominions, which they have ever since retained. The chief towns are Rostak, the residence of the imaum; Muscat, which is chiefly known to Europeans; and Kalhat and Sohar.

The country is ruled by a supreme chief or imaum, who, besides, holds in possession the islands of Keshmee and Ormuz in the gulf, and rents from the court of Persia Gomeroon, and Binderabbassee and its dependencies, including the district of Juroom, which extends from Mee-nab, on the south-east, to Khumeer, on the north-west, including about eighty miles of sea-coast. His revenues are derived from various sources. He receives a tenth part of the produce of the territories of Ommon, which is trifling; a duty of a half per cent. on all merchandise passing up the gulf on Arab bottoms, amounting, according to Frazer's estimate, to 160,000 dollars a year; the rents of valuable sulphur mines, which he holds of the Persian government; and considerable landed property in the country of Ommon, which brings him in only some thousands of dollars in the year. Commerce is perhaps the chief source of his income. He possesses five fine ships, his private property, two of them mounting fifty and forty guns respectively, besides four other vessels such as are used on the Arabian coast. His vessels trade to all parts of India and the East, to the coasts of Arabia and Africa, to Madagascar and the Mauritius, besides the ports of the Persian Gulf.

OMOA, a Spanish town and fortification on the southern side of the Bay of Honduras. Long. 89. 50. W. Lat. 15. 50. N.

OMOPHAGIA, an ancient Greek festival in honour of Bacchus, surnamed *Omophagos*, or the eater of raw flesh. This festival was observed in the same manner with the other festivals of Bacchus, in which the celebrants counterfeited madness. What was peculiar to it was, that the worshippers used to eat the entrails of goats, raw and bloody, in imitation of the god, who was supposed to have done the same thing.

OMPHALE, in fabulous history, a queen of Lydia, the daughter of Jardanus. She married Tmolus, who at his death left her mistress of his kingdom. Omphale having been informed of the great exploits of Hercules, wished to see so illustrious a hero; and her wish was soon gratified. After the murder of Eurytus, Hercules fell sick, and was ordered to be sold as a slave, that he might recover his health and the right use of his senses. Mercury was commissioned to sell him, but Omphale bought him, and

restored him to liberty. The hero became enamoured of his mistress, and the queen having favoured his passion, had a son by him, whom some call Agelaus, and others Lamon. From the son in question were descended Gyges and Cræsus; but this opinion is different from the account which represents these Lydian monarchs as having sprung from Alcæus, a son of Hercules by one of the female servants of Omphale. Hercules is represented by the poets as so desperately enamoured of the queen, that, to conciliate her esteem, he span by her side amongst her women, whilst she covered herself with the lion's skin, seized the club of the hero, and often struck him with her sandals for the uncouth manner in which he held the distaff.

OMRATTEE, a large, fortified, and trading town of Hindustan, in the province of Berar. It carries on an extensive trade in cotton, which is sent to Mirzapore by land carriage, a distance of 500 miles, and is sold in this celebrated mart for quadruple its original cost. Long. 78. 20. E. Lat. 20. 59. N.

OMREE, a town of Hindustan, in the province of Berar, belonging to the nizam. Long. 77. 64. E. Lat. 21. 7. N.

OMSK, a town of Asiatic Russia, in the government of Tomsk, situated at the junction of the river Om with the Irtysh. It is intended as a barrier against the incursions of the Kirghises. It is an agreeable town, and the general's house, the church, and the military school, are handsome edifices. It has always a garrison, and the inhabitants amount to 800. It is deficient in a supply of wood, which the coldness of the climate renders almost a necessary of life. The original fort was built in 1716, but was transferred to its present site in 1766. Long. 74. 54. E. Lat. 55. 4. N.

OMUDWARA, a district of Hindustan, in the Mah-ratta territories, and province of Malwah. It is a wild and uncultivated country, much covered with jungle; but where cultivated it is of great fertility, being intersected by the Sopra and Gilligsind Rivers.

ON, in *Ancient Geography*, a city of ancient Egypt, sacred to the sun, and on that account called by the Greeks *Heliopolis*. It was remarkable for the wisdom and learning of its priesthood, and for the spacious building in which they cultivated the studies of philosophy and astronomy. The priests of On were esteemed more noble than all the other priests of Egypt. They were always privy councillors and ministers of state; and therefore, when Pharaoh resolved to make Joseph his prime minister, he very wisely gave him in marriage a daughter of the priest of On, thereby incorporating him into the most venerable caste in Egypt. Bishop Warburton thinks that the superior nobility of the priests of On was chiefly owing to their high antiquity and great learning. That they were much addicted to the study of astronomy, we know from the testimony of Strabo; and indeed nothing is more probable than that they should have been attached to the study of that system over which their god, the Sun, presided, not only in his moral, but also in his natural capacity. The learned prelate affirms, that whether they received the doctrine from original tradition, or invented it at hazard, which last supposition he thinks more probable, it is certain they taught that the Sun is in the centre of its system, and that all the other bodies move round it in perpetual revolutions. "This noble theory," he continues, "came with the rest of the Egyptian learning into Greece (being brought thither by Pythagoras, who received it from Cénuphis a priest of On); and after having given the most distinguished lustre to his school, it sunk into obscurity, and suffered a total eclipse throughout a long succession of learned and unlearned ages, till these times restored its ancient splendour, and immoveably fixed it on the unerring principles of science."

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On.

Onateya
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Oneirocritics.

ONATEYA, or ONATIAYO, one of the Marquis of Mendoza's Islands, about five leagues to the east of Ohitahoo. It is three leagues in circumference, and of moderate elevation, with extensive woods and plantations. Long. 138. 55. E. Lat. 9. 55. S.

ONEEHOW, one of the Sandwich Islands, in the North Pacific Ocean, about forty miles in circumference. It contains abundance of yams, and a sweet root used by the inhabitants. The population is estimated at about 10,000.

ONEGA, a city of European Russia, in the province of Archangel. It is the capital of a circle of the same name, both so called from the river which waters a great part of the district, and at the mouth of which the city has been built. It is a small but well-built town, containing less than 2000 inhabitants, who subsist by trading in timber, pitch, and tar, and by exporting oats in some seasons to Norway. It has some trade in ship-building. It is about eighty miles from Archangel, and 916 from St Petersburg. Long. 38. 7. 40. E. Lat. 63. 53. 36. N.

ONEGA, a river and lake of the Russian empire. It is a hundred miles in length and forty in breadth, having a communication with the lake Ladoga, and consequently with St Petersburg. The river, which has its source in Cargapol, and gives its name to a country full of woods, falls into the White Sea.

ONEGLIA, a district of the province of Nice, in the kingdom of Sardinia, bounded on the south-east by the Gulf of Genoa, and on the other sides by the territory forming a part of that ancient republic. It is about ninety square miles in extent, and is almost covered with olive trees, which yield abundance of oil; besides which, wine, figs, silk, flax, and some corn, are produced. It was formerly considered as a principality, and gave the title of prince to the family of Doria. The principality was divided into three valleys; Oneiglia, Maro, and Prela. The capital, bearing the name of the district, is about one mile to the eastward of Port Maurice, and a mile and three quarters from Cape Verde. It stands upon a plain on the sea-shore, and the river Impero falls into the Mediterranean Sea on its western side. It is surrounded with walls, and defended by three forts; one in the centre, and one at each end. The anchorage-ground is good, but open to the prevailing winds. There are several religious houses for both sexes, a gymnasium, and a governor's palace. It contains about 4000 inhabitants. Long. 8. 2. E. Lat. 43. 53. N.

ONEIROCRITICA, the art of interpreting dreams, or a method of foretelling future events by means of dreams. The word is formed from the Greek *ὄνειρος*, a dream, and *κριτική*, from *κρίσις*, judgment. Some call it *oneirocratica*, and derive it from *ὄνειρος*, a dream, and *κρατέω*, I possess, or I command. It appears from several passages of Scripture, that, under the Jewish dispensation, there was such a thing as foretelling future events by dreams; but then a particular gift or revelation was expressly required for that purpose. Hence it has been inferred, that dreams are really significative, and forebode something to come; and all that is wanting amongst us is the *oneirocritica*, or the art of knowing what they foreshow. Yet it is the opinion of many that dreams are mere chimeras, bearing indeed some relation to what has passed, but none at all to what is to come. As to the case of Joseph, it was possible for God, who knew all things, to discover to him what still remained hidden in the womb of fate; and to introduce that disclosure, he might take the occasion of a dream.

ONEIROCRITICS, a title given to the interpreters of dreams, or those who judged of events from the circumstances of dreams. No great regard is to be paid to those Greek books called *oneirocritics*; nor do we know why the patriarch of Constantinople, and others, should have amused themselves with writing on so pitiful a subject. Rigault has

given us a collection of the Greek and Latin works of this kind; one attributed to Astrampsichus, and another to Nicephorus, patriarch of Constantinople; and to these are added the treatises of Artemidorus and Achmet. But the books themselves are little else than reveries; a kind of waking dreams, to explain and account for sleeping ones. According to them, all the secrets of oneirocriticism consists in the relation supposed to exist between the dream and the thing signified; but they are far from keeping to the relations of agreement and similitude, and frequently have recourse to others of dissimilitude and contrariety. Concerning oneirocritics and oneirocritica, the unlearned reader will find much information in Warburton's Divine Legation of Moses, and in the works to which he refers.

ONEVY, one of the Friendly Islands, in the Southern Pacific Ocean, near the north coast of Tongataboo.

ONGOLE, a district and town of Hindustan, in the province of the Carnatic, situated between the 15th and 16th degrees of north latitude. It was formerly dependent upon the principality of Cuddapah, and was afterwards incorporated with the Carnatic below the Ghauts, and in consequence came under the dominion of the nabob of Arcot, by whom it was transferred to the British in 1781. The principal rivers are the Mussy and the Gondamma; and the chief towns are Ongole, Courchier, and Sintalsheroo. Ongole was formerly a fortified town; but the fortifications, owing to the tranquil state of the country, have now been allowed to go to decay. It is 173 miles north by west from Madras. Long. 81. 1. E. Lat. 15. 31. N.

ONGOLOGUR, a town of Hindustan, possessed by independent zemindars, in the province of Orissa, fifty-five miles west from Cuttack. Long. 85. 20. E. Lat. 20. 36. N.

ONKELOS, surnamed the *Proselyte*, a famous rabbi of the first century, and author of the Chaldaic Targum on the Pentateuch. He flourished in the time of Jesus Christ, according to the Jewish writers, who all agree that he was, at least in some part of his life, contemporary with Jonathan Ben Uzziel, author of the second Targum upon the prophets. Prideaux thinks that he was the elder of the two, for several reasons, the chief of which is the purity of the style of his Targum, in which it comes nearest to that part of Daniel and Ezra which is in the Chaldaic, and being the truest standard of that language, is consequently the most ancient, since that language, as well as others, was in a constant fluctuation, and in every age continued deviating from the original. Nor does there appear to be any reason why Jonathan Ben Uzziel, when he undertook his Targum, should pass over the law, and begin with the prophets, except it be that he found Onkelos had done this work before him, and with a success which he could not exceed.

Azarias, the author of a book entitled *Meor Enaim*, or the "light of the eyes," tells us, that Onkelos was a proselyte in the time of Hillel and Samnai, and lived to see Jonathan Ben Uzziel, one of the prime scholars of Hillel. These three doctors flourished twelve years before Christ, according to the chronology of Gauz, who adds, that Onkelos was contemporary with Gamaliel the elder, St Paul's master, who was the grandson of Hillel. However, the same Gauz, by his calculation, places Onkelos a hundred years after Christ, and, in order to adjust his opinion with that of Azarias, extends the life of Onkelos to a great length. The Talmudists tell us that he assisted at the funeral of Gamaliel, and was at a prodigious expense to render it magnificent. Prideaux observes, that the Targum of Onkelos is rather a version than a paraphrase, since it renders the Hebrew text word for word, and for the most part accurately and exactly, and is by far the best of the kind; wherefore it has always been held amongst

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Onomancia the Jews in much greater esteem than the other Targums; and being set to the same musical notes with the Hebrew text, is thereby capable of being read in the same tone with it in their public assemblies. From the excellency and accuracy of the Targum of Onkelos, Prideaux also concludes that he must have been a native Jew, since, without having been bred up from his birth in the Jewish religion and learning, long exercised in all the rites and doctrines of both, and being also thoroughly skilled in both the Hebrew and Chaldaic languages, as far as a native Jew could be, he could scarcely have been thoroughly adequate to the work which he executed. The same author also thinks, that the representing him as a proselyte may have proceeded from the error of supposing him to have been the same with Akilas or Aquila of Pontus, author of the Greek Targum or version of the prophets and Hagiographia, and who was indeed a Jewish proselyte.

ONOMANCIA, or rather *ONOMANTIA*, a branch of divination, which foretells the good or bad fortune of a man from the letters in his name. Upon much the same principle the young Romans were accustomed to toast their mistresses as often as there were letters in their names. Hence Martial says,

Nævia sex cyathis, septem Justina bibatur.

ONOMATOPOEIA, in grammar and rhetoric, a figure where words are formed to resemble the sound emitted by the things signified; as the buzz of bees, the cackling of hens, or the note of the cuckoo. Resemblances of this kind are often fancied when they are not real; though, no doubt, there are in every language some words of which the sound is very like to that which those words are employed to express. Yet, to the mortification of grammarians and rhetoricians, conjunctions, which have been pronounced to be no parts of speech at all, are the only sounds uttered by men which are wholly natural, and these are fewer than is commonly supposed.

ONON, a large river of Asiatic Russia, upon the frontier of Chinese Tartary, which has its rise amongst the interior mountains, and flows north-east till it forms the Chilka, which afterwards discharges itself into the Amour. The rude tribes of the Bannats and Tungusses wander along its banks.

ONONDAGA, a post township and capital of Onondaga county, New York, a hundred and thirty miles west-north-west of Albany, and fifty miles west of Utica. It is ten miles in length by nine in breadth. Through the eastern part a broad valley extends north and south, bounded on each side by high swelling ridges. This valley, which is of rich alluvion and exuberant fertility, is watered by Onondaga Creek, which flows northward to Onondaga Lake, in the town of Salina. The post borough of Onondaga, the seat of the county buildings, is situated on a delightful eminence. The post village of Onondaga Hollow stands about one mile east of the court-house. It has an arsenal belonging to the state, and many mechanical establishments. Onondaga Castle is the chief town of the remnant of the Onondaga tribe of Indians, after whom the township has been named. It is situated three miles south of the village of Onondaga Hollow, and contains about fifty Indian houses, which are built of logs. There are about a hundred and forty persons, who annually receive a thousand dollars from the state of New York. The whole township of Onondaga in 1831 contained 5668 inhabitants, and it does not seem to be rapidly increasing.

ONORE, formerly a seaport of Hindustan, and a place of great commerce, in the province of North Canara. It is situated at the mouth of a river which communicates with a fine salt-water lake, extending nearly as far to the east as the foot of the mountains. In 1763 it was occupied by Hyder Ali, who established dock-yards for build-

ing ships of war, which were found to have been demolished by Tippoo at the time the town was recovered by the treaty of Mangalore. Part of the town has been rebuilt, and there is now a custom-house here. A trade is carried on in rice, betel-nut, pepper, cocoa-nuts, and salt fish. This trade was carried on in boats, which were much harassed by pirates from the Mahratta coast; an evil that has always existed more or less on the shores of India, but has now nearly ceased, owing to the vigilance of the British marine. No manufactures ever existed to any extent, the trade having been destroyed by Tippoo. On the first arrival of the Portuguese in India, Onore was the capital of an independent rajah, who was subdued by them. It was subsequently taken from the Portuguese by the Dutch, who appear to have relinquished it; for, in 1763, when it came into the possession of Hyder Ali, it was considered as the property of the ranee of Bednore. In 1768 it was taken by the British, and was shortly afterwards regained by Hyder. It was taken in 1783 by General Matthews, and was restored to Tippoo at the conclusion of the year. It came under the dominion of the British, with the province of Canara, when Tippoo's empire was overthrown, in 1799. Long. 74. 25. E. Lat. 14. 18. N.

ONOSANDER, a Greek author and Platonic philosopher, who wrote Commentaries on Plato's Politics, which are now lost. But his name is particularly famous for a treatise entitled *Λόγος Στρατηγικός*, a discourse on the duties and qualities of the general of an army, which has been translated into Latin, Italian, Spanish, and French. The time when he lived is not precisely known, but he is imagined to have been contemporary with the Emperor Claudius.

ONRUST, a small island in the Eastern Ocean, on the coast of Java, and Bay of Batavia. It is nearly of a circular form, about 4800 feet in circumference. Here the Dutch had formerly fortifications and extensive works, which were destroyed by a British armament under Sir Edward Pellew, and the island is now desolate. Onrust formerly contained about 3000 inhabitants. It is nine miles north-west from Batavia.

ONTAREE, a town of Hindustan, in the province of Gundwana, belonging to an independent chief in the district of Billounjah. Long. 83. 40. E. Lat. 24. 13. N.

ONTARIO, one of the five great lakes which separate Canada from the United States, and which are the wonder and admiration of the world. It is situated between the parallels of 43. 10. and 44. 11. of north latitude, and the meridians of 76. 25. and 79. 56. of west longitude, being the most easterly of these vast inland seas. It lies nearly east and west, and is of an elliptical shape, being a hundred and seventy-two miles in length by fifty-nine and a quarter in extreme breadth, and having a circumference of about four hundred and sixty-seven miles. The depth of water varies exceedingly, from a few feet up to several hundreds. Towards the middle, attempts have been made to reach the bottom with three hundred fathoms, without striking soundings. If this be correct, the bottom must be very considerably below the level of the Atlantic Ocean; for its surface is only two hundred and thirty-one feet above tide-water at Three Rivers on the St Lawrence, and at Albany on the Hudson. The appearance of the shores of Lake Ontario exhibit great diversity. Towards the north-east part they are low, with numerous marshy places. To the north and north-west they assume a grand and lofty character, but subside again on the south to a very moderate elevation. Bordering the lake, the country is everywhere covered with woods, through the numerous openings of which frequent settlements are seen, imparting a pleasing effect, which is greatly enhanced by the white cliffs of Toronto, and the remarkable high land over Presqu'île, called the Devil's Nose, on the north. The view on the

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south is well relieved by a back ground of hills, which, after forming the precipice of the cataract, stretch away to the eastward. The crowning object of the prospect in this direction is a conical eminence towering above the chain of heights, called Fifty-Mile Hill, as denoting its distance from the town of Niagara. Along the southern border of the lake is the celebrated ridge road, or alluvial way, extending from Rochester on the Genessee, to Lewiston on the river Niagara, eighty-seven miles. It is composed of common beech sand, and gravel-stones worn smooth, and these are intermixed with small shells. Its general width is from four to eight rods, and it is raised in the middle with a handsome crowning arch, the general surface preserving a very uniform level. It is between a hundred and twenty and a hundred and thirty feet above Lake Ontario, whence it is distant from six to ten miles.

A great number of rivers flow into Lake Ontario. Towards the western part it receives the Niagara, and from this point to the St Lawrence River, which flows from the north-east part of the lake, the line dividing Canada from the United States is in the middle of the lake, so that nearly one half of it is in the state of New York. From this state it receives the Genessee, Oswego, and Black Rivers, besides a number of smaller streams, all of which have a sand bar across the entrance. There are some fine bays and inlets, where vessels of every description may find protection in bad weather. The largest of these are Chaumont, Sodus, Little Sodus, Toronto, and Braddocks, on the United States' side of the lake; and Quinte, Burlington, and many other large ones, on the Canada side. Burlington Bay is both spacious and secure; and the disadvantages of a narrow entrance and shallow water have been obviated by a canal cut across the breach, which has opened an access to the bay for lake vessels, and made it an important and interesting harbour. Hungry Bay is very conspicuous, affording good anchorage and safe shelter amongst the islands to ships of the largest size at all seasons. York and Kingston harbours belonging to Great Britain, and Sacket's harbour to the Americans, possess every natural advantage, and are considered as the best upon the lake. The two latter are strongly fortified, being the arsenals where ships of war, even of the first rate, have been constructed by both powers, and where were fitted out those powerful hostile squadrons which conferred so much consequence on the naval operations in this quarter. Lake Ontario is navigated by sloops, schooners, and steam-boats; and the sea is frequently so rough, and swept by such heavy squalls of wind, that steam-boats of common size were at first not considered as fit to traverse its waters with comfort and safety. Of the many islands situated at the eastern end of the lake, Wolf or Grand Island, lying abreast of Kingston, is the most extensive, and, by being placed at the commencement of the Cataraqui River, forms two channels leading into it, which bear the names of the North or Kingston Channel, and the South or Carleton Island Channel. Stony and Grenadier Islands are situated at the eastern end, and there are some at Quinte Bay in Canada. Lake Ontario abounds with excellent fish of various kinds, the most celebrated of which are the Oswego bass, the salmon, trout, and salmon-trout. (R. R. R.)

ONTINIENTE, a large town of Spain, in the province of Valencia, in the department of San Felipe. It is an open town, in the vicinity of the mountains, but stands in a fruitful spot, and is remarkable for the salubrity of its climate. Figs are cultivated near it of good quality, of which about 7000 quintals are annually collected and sent to other districts. The hilly parts in the vicinity produce excellent pears and apples, and near them is raised the best wheat in Spain. The inhabitants amount to 11,700, who, besides cultivation, have some employment in making linen and woollen goods, paper, and copper wares. Being

inland, and out of any great road, it is a place very rarely visited by foreign travellers.

ONTONG JAVA, a group of islands in the Pacific Ocean, called by Mendana, Baxos de la Candelaria. They are twenty-two in number, and are now called New Ireland. Long. 156. E. Lat. 6. 15. S.

ONYCOMANCY, or, as some persons write it, ONYMANCY, a kind of divination by means of the nails of the fingers. The word is formed from the Greek *ὄνυξ*, a nail, and *μαντεία*, divination. The ancient practice was to rub the nails of a youth with oil and soot, or wax, and to hold up the nails thus smeared against the sun, when certain figures or characters, showing the thing required, were supposed to appear upon them.

ONYX, a mineral substance usually ranked amongst gems, and which derives its name from the colour resembling that of the nail of the finger.

OOCHASEER, a town of Hindustan, in the province of Cutch, and district of Neyer, about twenty-five miles south-west from Theraud, which belongs to the chief of Morwara. It is surrounded by a thorn hedge instead of fortifications, and has a tank of bad water, with some excellent wells. Its inhabitants are low classes of Hindus.

OOCHINADROOG, a celebrated hill-fort of Hindustan, in the district of Harpoonelly. It is of great natural strength, having an abrupt ascent of very great height, particularly to the north and west, where it is almost perpendicular. It was besieged in 1793, and taken after a siege of three months, by Tippoo, who, with the cruelty of a tyrant, mutilated all the boys and youths in the fortress, most of whom died in consequence. Long. 75. 55. E. Lat. 14. 32. N.

OODEADARGAM, a town of the south of India, in the province of Mysore. It was taken by the British in the year 1800, and now belongs to the rajah of Mysore. It gives name to a celebrated pass in the mountains, and is thirty-one miles south-east of Bangalore.

OOJAIN, a celebrated city and district of Hindustan, in the province of Malwah. The district is situated between the twenty-third and twenty-fourth degrees of north latitude, and between the seventy-fifth and seventy-seventh of east longitude. The soil is in general a black vegetable mould, which is reduced during the rainy season nearly to the consistence of mud; and when it is dried by the sun it cracks in all directions, and the fissures are so wide and deep as to render travelling dangerous. Besides the city of Oojain, this district contains 175 villages. It produces the mango, guava, plantain, melon, and several varieties of the orange and lime trees.

The capital of the above mentioned district is also named Oojain, and is the principal residence of Scindia. It is situated on the Sipperah River, and is one of the most ancient cities of Hindustan, being, according to Major Rennell, the city which was known to the Greeks under the name of Ozene. It is called in the Sanscrit Ujayini, and is stated in authentic records to have been the capital of the rajah Bickermajit, a short time after the commencement of the Christian era. The ancient city was either much larger than the modern town, or it stood almost a mile to the north of it. It was overwhelmed by a violent earthquake at a time when it was the seat of empire, as well as of the arts and of learning. Its site is easily known; for, in digging to the depth of fifteen feet, brick walls, pillars of stone, and other ruins, are discovered. Adjoining these subterranean ruins there is a remarkable cavern, which consists of a long gallery, supported by pillars, with chambers excavated in each, and containing a number of figures carved on the walls, which are of granite. Amongst the ruins ancient coins are frequently found. The modern city of Oojain is of an oblong form, about six miles in circumference, and surrounded by a stone wall with round towers. This space

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Oojain.

Oojain. includes some waste ground, but the inhabited part occupies the greater portion, and is much crowded with buildings and population. The houses are built of brick, and covered with tiles. The principal bazaar is a spacious and regular street, paved with stone, and having houses of two stories in height on each side. The whole of the lower story is laid out in shops, the ascent to which is by five or six steps from the street; the upper stories are the dwellings of the owners. The most remarkable buildings in the town are the mosques and temples; Scindia's temple is but a poor building, and is so surrounded by other buildings as to be scarcely observable. The southern quarter of the city is called Jeysingpoor; it contains an observatory, erected by rajah Jyesing of Jyenagur in the early part of last century. An extensive fort and citadel were founded by Mahdajee Scindia, at the distance of about two miles from the city, containing a palace. But these works were stopped at his death, and Gwalior was preferred by the reigning chief as his stronghold and place of refuge. Oojain carries on a considerable trade. From Surat are imported various kinds of European and Chinese goods, which are frequently sold here at a very low price. From Marwar are brought pearls, and quantities of assa-fœtida; the production of Sinde. Diamonds from Bundelcund also pass through this city on their way to Surat. The city is well supplied with provisions; and fruits, vegetables, and grain abound in all the public markets.

Oojain is a very ancient city; the rajahs who governed it are mentioned by Ferishta as early as A. D. 1008; and it was conquered by the Mahommedans about 1230. The first of the princes who reigned here was named Jyapa Scindia, who was a servant of Bajerow the peishwa, by whom, in reward for his services, the city and district of Oojain were made over to him. He was succeeded by his son Junkojee, who was murdered after the battle of Paniput, and his uncle Ranojee obtained possession of his territories. This chief left two sons, Kedjaree and Mahdajee. The latter being the more aspiring of the two, acquired possession of the sovereignty. He was a brave and active officer, and commanded a division of troops in the memorable battle of Paniput, in which he was severely wounded in the thigh. He rose afterwards to high command, and to extensive dominion. He introduced European discipline amongst his troops, by whose aid he not only rivalled in power the greatest Mahratta chiefs, but conquered a large tract of Hindustan proper, and gained possession of the capital, Delhi, with its fallen monarch, the representative of the Great Mogul. He died in 1794, without issue, leaving the whole of his possessions to his adopted son and grand nephew Dowlut Row Scindia. In the year 1803, Scindia ventured to try his strength with the British, and a war ensued, which was soon terminated by a series of signal victories gained over his imperfectly disciplined troops, by Lord Lake and General Wellesley. He was in consequence soon compelled to sue for peace, which was concluded on the 30th of December 1803, on condition that he should cede all the territory situated between the Ganges and the Jumna, and all his possessions of every description in the country to the northward of those belonging to the rajahs of Jyenagur and Joudpoor, and the ranah of Gohud. He also relinquished to the British government the fort and territory of Broach, and the fort and territory of Ahmednuggur, and all his possessions to the south of the Agunttee Hills, including the fort and district of Gondapoor, and all the other districts between that range of hills and the Godavery. Several forts, towns, and districts, were restored to Scindia. Two of the articles in the treaty, namely, the cession of the strong fortress of Gwalior, and a subsidiary force of 6000 men to be constantly stationed with Scindia, were relinquished by Lord Cornwallis, on his return to India. On the 23d of

March 1804, a treaty offensive and defensive was concluded with Scindia by Colonel, afterwards Sir John Malcolm, on the part of the British government, by which Scindia agreed to receive a British subsidiary force of 6000 men, to be stationed near his frontier; and, in the event of a war, engaged to join the Company's forces with 6000 infantry and 10,000 cavalry. He also agreed to submit all the differences he might have with the peishwa to British arbitration. It was agreed that the Chumbul should henceforth be the boundary between the two states. When the war broke out with the Pindarrees, the policy of Scindia excited strong suspicions, against him; in consequence of which a new treaty was concluded in 1817, in which it was agreed that he should use his utmost exertions against the Pindarees, and that he should admit British garrisons into the fortresses of Hindia and Aseerghur during the war. The territories possessed by Scindia are still very considerable, and are supposed to yield him nearly a million per annum. For further particulars respecting this prince, see the article HINDUSTAN.

OON, a town of Hindustan, in the province of Gujerat, and district of Werrear, fifteen miles north of Rahdunpoor. The town contains about 2000 tolerably well-built houses, and the palace of the rajah. It is an open town, with one long street, which is a bazaar. The chief of this town is a Hindu of a low tribe, who derives his income of 12,000 rupees a year chiefly from the plunder of his neighbours. Long. 71. 45. E. Lat. 24. 15. N.

OONAE, a small village of Hindustan, in the province of Gujerat, belonging to the Mahrattas. It has in its vicinity a remarkable hot spring, which, like all the other extraordinary phenomena of nature, is held sacred by the Hindus, and a great resort of pilgrims, who ascribe to it the most wonderful qualities.

OONARANG, a small European town and fort of Java, on the south coast, where the Dutch governor Janssens made his last stand when the island was attacked by the British general. It is eleven miles south from Samarang.

OONIARA, a town of Hindustan, in the province of Ajmeer. It is strongly fortified with a wall and round towers; the houses are mostly built of stone, and the palace is neatly constructed with a stone enclosure, surrounded by a ditch. Long. 75. 58. E. Lat. 25. 51. N.

OONOMAFU, an island in the South Pacific Ocean, about six miles in length, and covered with verdure. It was discovered in 1616 by Schouten and Le Maire. Long. 175. 51. W. Lat. 15. 53. S.

OOREECHA, a populous town of Hindustan, belonging to the rajah of Jyenagur, in the province of Ajmeer.

OOREY, a town of Hindustan, in the province of Agra, fifteen miles west of the river Jumna. Long. 79. 35. E. Lat. 25. 58. N.

OOSCAT, a considerable town of Anatolia, in Asia Minor, situated in a hollow, surrounded on all sides by naked and barren hills. The houses are neatly constructed of brick and wood, painted like those in the other Turkish towns. The palace is a very extensive building of brick and wood, but only two stories high; and a handsome mosque has lately been erected, of hewn stone, in imitation of St Sophia. It is surrounded by a slight wall, built of sun-dried brick and mud. The inhabitants amount to 16,000, of whom the greater number are Turks, and the remainder Greeks, Armenians, and Jews. It is 110 miles east of Angora. Lat. 39. 42. N.

OOSCOTTA, a fortress of the south of India, in the province of Mysore. It was occupied by the Mahrattas in the year 1688, but was taken from them by the nabob of Cuddapah, and retaken by the Mahrattas. In 1761 it was besieged and taken by Hyder Ali; and seven years afterwards it was taken by the British, but recovered by Hyder in 1773. It fell under the power of the British in

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1779, and was made over to the new rajah of Mysore along with the province. It is fifteen miles north-east of Bangalore.

OOSSOOR, or OUSOOR, a fortress of Hindustan, in the southern province of Mysore. It was first taken by the British in 1768, and again in 1791. After the death of Tippoo, this town, with the province, was made over to the new rajah of Mysore. It is twenty miles south-south-east from Bangalore. Long. 72. 52. E. Lat. 12. 41. N.

OOSTERHOUT, a market-town of the Netherlands, in the province of North Brabant, and the arrondissement of Breda. It is a considerable place for making pottery ware and tiles, and has large markets three times a year for the sale of linen cloth. It is five miles to the north of Breda, and contains 6950 inhabitants.

OOTAPALLIUM, a town and district of the south of India, in the district of Dindigul. Long. 77. 30. E. Lat. 9. 50. N.

OOTATATOOR, a town of the south of India, in the district of Tanjore. Long. 70. 58. E. Lat. 11. 7. N.

OOTRADOORG, one of the numerous fortresses with which the country of Mysore is covered. It was taken by the British in 1792. Long. 77. 17. E. Lat. 12. 56. N.

OOTRIMALOOR, a town of the south of India, in the province of the Carnatic. Long. 79. 50. E. Lat. 12. 33. N.

OPALIA, in *Antiquity*, feasts celebrated at Rome in honour of the goddess Ops. Varro says they were held on the 19th of December, which was one of the days of the Saturnalia. These two feasts were celebrated in the same month, because Saturn and Ops were husband and wife; but the vows offered to the goddess were made sitting on the ground.

OPARO, an island in the Pacific Ocean, discovered by Captain Vancouver in 1791. It consists of a cluster of high craggy mountains. The natives are estimated at 1500, who appeared to be well fed, and to have open and cheerful countenances. Long. 215. 58. E. Lat. 27. 36. S.

OPERA, a lyrical drama set to music in recitatives, airs, duetts, trios, quartetts, choruses, and *finales*; preceded by an instrumental overture, and accompanied by an orchestra; and, when performed, enforced and embellished by action and declamation, and appropriate costumes and scenery. The opera appears to have originated at Florence about the end of the sixteenth century. (See Doni's works, *passim*.) The Italians divide their operas into four kinds; the *sacred opera*, the *serious opera*, the *semi-serious opera*, and the *opera buffa*, or *comic opera*. The French have their *grand opera*, in which the whole lyrical drama is sung; and the *opera comique*, in which the singing is intermingled with spoken dialogue. The Germans have a greater variety of such distinctions of operas; as the *grand opera*, the *serious opera*, the *tragic opera*, the *heroic opera*, the *romantic opera*, the *allegorical opera*, the *military melodrama*, the *comic opera*, and some others.

Much amusing and interesting matter relative to the rise and progress of the *opera* may be found in Dr Burney's *Tours, and History, in the Baron de Grimm's Correspondence*, and in various German periodicals conducted by musicians. See also Arteaga, Manfredini, Signorelli, &c. For some technicalities relative to operatic music, see the article *MUSIC*.

OPHICLEIDE, or KEYED-SERPENT. See *MUSIC*.

OPHIOLOGY is composed of two Greek words, namely, *ὄφις*, a *serpent*, and *λόγος*, a *discourse*, and consequently denotes that branch of zoology which treats of serpents. See *REPTILIA*.

OPHIOMANCY, in *Antiquity*, the art of predicting future events from the motions or habits of serpents. Thus Calchas, on seeing a serpent devour eight sparrows, with their dam, foretold the duration of the siege of Troy; and the seven coils of a serpent which was seen on the tomb

of Anchises were interpreted to mean the seven years during which Æneas wandered from place to place before he arrived at Latium.

OPHIR, a country mentioned in Scripture, from whence Solomon received great quantities of gold in ships which he sent out for that purpose. The difficulty, however, is, where to fix its situation. Some have gone in search of it to the West, others to the East Indies, and a few to the eastern coast of Africa. Mr Bruce places it in the kingdom of Sofala, on the coast of Mozambique; and he supports this hypothesis with great learning and ingenuity. It was, on the other hand, strenuously maintained by Dr Doig, a learned contributor to the third edition of this *Encyclopædia*, that it was situated somewhere on the western coast of Africa, and that the Tarshish of Solomon was the ancient Bætica in Spain. Whether the one hypothesis or the other be the true one, it is not for us to decide. Both are plausible, and both supported by much ingenuity and erudition; but we do not think that the arguments of either writer furnish a complete confutation of those employed by the other.

OPHITES, in *Ecclesiastical History*, Christian heretics, so called both from the veneration they had for the serpent which tempted Eve, and the worship they paid to a real serpent. They pretended that the serpent was Jesus Christ, and that he taught men the knowledge of good and evil. They distinguished between Jesus and Christ. Jesus, they said, was born of the Virgin Mary, but Christ came down from heaven to be united with him; Jesus was crucified, but Christ had left him to return to heaven. They likewise distinguished the God of the Jews, whom they termed *Jaldabaoth*, from the supreme God; ascribing to the former the body, and to the latter the soul of man. They had a live serpent, which they kept in a kind of cage; and at certain times they opened the cage door, and called to the reptile. The animal came out, and mounting upon the table, twined itself about some loaves of bread, which they broke and distributed to the company, all of whom kissed the serpent. And this, by a horrid blasphemy, they called their *Eucharist*.

OPHTHALMOSCOPY, a branch of physiognomy, which deduces the knowledge of a man's temper and character from the appearance of his eyes.

OPIATES, medicines which are administered to procure sleep, whether in the form of electuaries, drops, or pills.

OPINION is that judgment which the mind forms of any proposition, for the truth or falsehood of which there is not sufficient evidence to produce science or absolute belief. That the three angles of a plane triangle are equal to two right angles, is not a matter of opinion, nor can it with propriety be called an object of the mathematician's belief; he does more than believe it, he *knows* it to be true. When two or three men, under no temptation to deceive, declare that they were witnesses of an uncommon though not preternatural event, their testimony is complete evidence, and produces absolute belief in the minds of those to whom it is given; but it does not produce science like rigid demonstration. The fact is not doubted, but those who have it on report do not know it to be true, as they know the truth of propositions intuitively or demonstrably certain. When one or two men relate a story including many circumstances to a third person, and another comes who positively contradicts it either in whole or in part, he to whom these jarring testimonies are given weighs all the circumstances in his own mind, balances the one against the other, and lends an assent, more or less wavering, to that side on which the evidence appears to preponderate. This assent is his opinion respecting the facts of which he has received such different accounts.

Ophir
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Opinion.

Opium
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Oporto.

OPIUM, in the *Materia Medica*, is an inspissated juice, obtained from the capsule of the white poppy; it is partly of the resinous and partly of the gummy kind, and possesses also a narcotic principle.

OPOCALPASUM, OPOCARBASUM, or APOCALPASUM, a gummy, resinous substance, which has a strong resemblance to liquid myrrh, and which in the time of Galen was mixed with myrrh. According to this writer, it was difficult to distinguish the one from the other except by their effects, the former being of a poisonous nature, and frequently producing lethargy.

OPORTO, or PORTO, a city of Portugal, usually considered as the northern capital of that kingdom, and one of the most important commercial places of the peninsula. It is situated in the province Entre Douro and Minho, at the mouth of the latter river. The land near the mouth of the river is generally low, but the city, being situated on an elevation on the northern bank, may be descried at the distance of four or five leagues, by a remarkably black steeple, called Los Clerigos, which rises in the middle of it. On approaching the bar, the town and castle of St John de Foz are seen upon low land, near the mouth of the river, with a lighthouse, lighted every night. On the northern point of the castle of St John de Foz a ledge of rocks extends towards the south-west, some of them above water; and without these, on the opposite side, is a similar ledge. This formation renders the entrance difficult without much previous knowledge, especially as with winds from the south-west and the north-west a heavy sea sets in along the coast. The bar of the Douro is liable to alterations of its position from gales of wind, which makes it the more necessary to take a pilot, a matter not difficult, as there are plenty of fishermen perfectly competent, who are ready to act in that capacity. When vessels have passed the bar they are in a state of security, except at periods when, after a heavy fall of rain, such torrents rush down the Douro as to raise the water from thirty to forty feet in a few hours. These *freshes*, as they are called, have also a great influence in changing the position of the bar. The vessels that are intended for the harbour of Oporto should not, however, draw more than sixteen feet water.

As this city gives name to the whole kingdom of which it forms the second capital, a short sketch of its history may be appropriate. It is first noticed in the itinerary of the Emperor Antoninus, in the year A. D. 160, under the name Cago or Gaia, but was then on the opposite bank of the river, and defended the passage over it against the forces of Viriato. When the Goths, Vandals, Alans, and Suevi had overrun France and Spain, and attained the end of their career, the Alans entered Lusitania, and established their capital in this city, which they adorned and fortified, giving it the name of *Castrum Novum*, to distinguish it from Cale or Caya, the ancient part, on the opposite bank of the river, called *Castrum Antiquum*. This part of Lusitania was seized upon, about the year 540, by the Arian Goths, under their King Leovogildo, who put to the sword all who refused to embrace his opinions, and, as has been said, amongst others his own son. The Goths maintained their dominion till the invasion of the Moors in 716, when Abdulhassan overran all Galicia, and possessed himself of the whole country up to the river Douro. It fell again into the hands of the Christians, when again the Moorish chieftain Abderrahman, attacked the Catholic King Alfonso I. in 820. A desperate battle was fought at Campanha, in which the Moors were defeated, and many of them driven into the river Tinto; and a part of the city whence the Christians issued to the contest still retains the name of Batalha. Another Moorish chief subsequently conquered the city, and retained his power within it till 1092, when some Gascon knights, under the command of Don Alfon-

VOL. XVI.

so Fredriquez, finally subdued the Moors; since which it has been retained by the Christians, and followed the fortune of the rest of Portugal.

Oporto is about two miles from the mouth of the river, on the right bank, from which it rises abruptly by an ascent, in some parts attained by a flight of 140 steps. It occupies a valley and several hills, which render some of the streets very steep. Its back or north part rests upon rocky heights, in which are quarries of granite that have yielded the stone with which the city has been built. There are many magnificent and spacious streets, well paved for foot passengers, with some fine churches, convents, and other public buildings; and these are interspersed with numerous gardens, abounding with flowers and beautiful shrubs, which give an air of great beauty to the whole place. The most remarkable edifices, as in most Catholic cities, are those devoted to religious purposes, as churches, convents, and monasteries. The most striking are very magnificently ornamented. The cathedral is a superb building, which was constructed in 1112, by Count Henrique de Porto, and the ascent to the choir is by a fine broad marble staircase. The collegiate church of Cedofeita is the next in celebrity. It is a purely Gothic structure, built in the year 559, and was left untouched by the Moors, having been redeemed from destruction by a noble family of the name of Connigos, who paid a yearly tribute for its preservation. The church of Misericordia, built in the year 1555, belongs to a corporate body, which relieves misery of all kinds, takes care of more than 2000 sick, maintains 900 foundlings, and buries those whose friends cannot afford to do so. The church of the Clerigos, built in 1748, stands at the top of a fine wide street called Calçada de Natividade. It is a superb building, most beautifully ornamented, and has a tower, before noticed, the most lofty in the kingdom, if not in Europe, which may be seen from the sea at the distance of several leagues. The other parochial churches are St Nicolao, said to be the richest, St Victoria, St Ildefonso, Santa Marinha, in Villa Nova; San Pedro; Miragaya Terco e Caridade, which is connected with a good hospital; Nosso Venhor de Bom Fim; St Pedro Gonsalvez, appropriated to the seamen; Bon Jesus de Gaya, and Senora de Lapa. Besides these, there are about eighty chapels, some of them elegantly fitted up, in which the public religious worship is celebrated. There were twelve monasteries, containing no less than 380 monks; but some of them were destroyed during the siege of Oporto by Dom Miguel, and others suffered severely. There were five convents, which contained about 340 nuns of different orders, besides numerous females who resided in them under the tuition of the nuns.

There are few cities in Europe in which the charitable institutions are more numerous than in Oporto. The public hospitals especially are extensive establishments. The principal of them is the Hospital Real, which is built of granite, and has the appearance of a palace, and is remarkable not more for its extent and grandeur than for the great number of patients which are relieved in it; they are attended by the best physicians and surgeons, both English and Portuguese, and are supplied with the best medicines, dispensed not only to the sick in the house, but also to out-door patients at half price. Of a less extent are the foundling hospital, two for unfortunate and poor females, one for beggars, one for poor old women, one for the English, and three upon a small scale distinguished by the names of St Sylva, San Crispin, and San Francisco da Carma.

This city suffered severely during the long siege which commenced in December 1833, and continued till August 1834. It was a period of severe misery to the inhabitants, as well from the constant fire kept up against the

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Oporto.

town, as from the scarcity of food, fuel, and other necessities. The army of Dom Miguel had surrounded the city with works, which extended in a circuit of nearly fourteen miles, and from the forts on those lines kept up a cannonade and bombardment. The effect of the former was to make an impression upon the works of Dom Pedro, and that of the latter to destroy whatever was destructible in the houses of the inhabitants, and in the public buildings. The churches were spared by the assailants as far as their position did not interfere with the military operations. Both the public and the private buildings are constructed of massy blocks of stone, and have little combustible matter in their composition. Thus, though the windows, the decorations, and the furniture of many buildings, were much injured or destroyed, and more than sixteen thousand of the civic inhabitants killed, there was but little damage done to the interior appearance of the place; and as far as that was concerned, a very short period witnessed the restoration of the city to its former beauty. Within two years after the termination of the siege the inhabitants had in a great degree returned to those mercantile pursuits and habits which have long distinguished the city.

Oporto, in a national view, is a commercial place of the greatest importance, being the channel by which the most valuable produce of the soil of Portugal is distributed to other countries. That soil is peculiarly favourable to the growth of a strong red wine, highly relished in England, and not much esteemed in any other part of the world. It is produced from a grape originally transported from Burgundy to the banks of the Douro, whence it has spread throughout the province of Tras os Montes and the interior and higher grounds of the province Entre Douro and Minho. From the growers the wines are collected by merchants of Oporto, and preserved in large quantities till they are shipped for the markets of consumption. The best of the wines formed the subject of a monopoly to a privileged company, who possessed the right of pre-emption of a limited number of pipes before the general buyers were allowed to make their contracts. That monopoly has been abolished, a circumstance which has given a new direction to the internal trade; but the sufferings occasioned by the siege are still felt, and this, with the change of system, has made it difficult to prognosticate what may be the future condition of the wine trade in this city. One thing is certain, however, that as long as the taste for port wine continues in Great Britain as it has hitherto done, the trade of Oporto must be of the greatest importance to the kingdom of Portugal.

An Account of the number of Pipes of Wine shipped at Oporto from 1824 to 1833, distinguishing those to the British dominions from those to all other countries.

Years.	Pipes sent to Great Britain.	Pipes sent to all other Countries.	Total.
1824.....	19,968	6,049	26,117
1825.....	40,277	170	40,447
1826.....	18,310	287	18,597
1827.....	24,207	10,003	34,237
1828.....	27,932	13,295	41,227
1829.....	17,832	7,533	25,371
1830.....	19,333	4,832	24,165
1831.....	20,171	3,268	23,439
1832.....	13,575	2,975	16,550
1833.....	19,432	1,063	20,495
	231,037	49,575	270,645
Average annual export.....	23,103	4,957	27,064

Of the number of pipes, 49,575, sent to other countries than Great Britain in these ten years, Brazil took 28,261, the other parts of South America 8944, whilst North America, the whole of Europe, India, and Africa, took only 12,370 pipes, of which Hamburg alone received 5573. This statement shows to what an extent the north of Portugal is dependent upon the consumption of Great Britain for the chief product of its soil. A duty is collected from the wine, both on its transport from the interior, and on its exportation to foreign countries. The amount varies with the kind and quality of the wine, and is often subject to considerable fluctuation.

The other exports from Oporto consist of oil, oranges, figs, and various fruits, wool, refined sugar, cream of tartar, shumac, leather, and cork. The imported articles are, corn, rice, and other provisions; sugar and coffee from Brazil; cotton and woollen goods, hardware, tin plates, butter, and cheese, from Great Britain and Ireland; and hemp, flax, deals, and other timber, from Norway or the Baltic. It is said that a large portion of the British cottons and woollens imported at this place are for the purpose of being carried into Spain through Braganza and other frontier towns, by means of the contraband trade.

The manufactures of the city suffered exceedingly by the siege, but are now reviving. The sugar refineries are considerable; gold and silver lace is made, and also some hosiery. Cotton and linen weaving gives some occupation, as do the making of glass and paper. Though the population was reduced by the siege, it is now rapidly recovering its former state, and, by the latest calculation, amounts to about 80,000. Though somewhat cold in the winter, and therefore not so much visited by invalids as Lisbon, Oporto is generally considered as a more healthy city. The latitude, by accurate observation, is 41. 11. 15. N. the longitude 8. 8. 22. west from London.

OPPELN forms one of three provincial governments of Prussia, into which the province of Silesia is divided. It is bounded on the north by the government of Breslau, on the east by the kingdom of Poland and the republic of Cracow, on the south-east by Galicia, on the south and south-west by Moravia, or rather Austrian Silesia, and on the west by the province of Reichenbach. In extent it is 5230 square miles, comprehending fifty-four cities and towns, and 1492 villages; and it is divided into fifteen circles. The population, according to the census of 1817, amounted to 529,964 individuals, and, according to that of 1834, had increased to 757,968. Of these inhabitants, about nine tenths are Catholics, and the remainder is divided into various sects. It is drained by the river Oder, into which all the streams run. The soil is not very fertile, and its most valuable produce is derived from its extensive forests. The chief industry is applied to spinning and to making wooden ware. The city of Oppeln, the capital of the province, as well as of the circle of the same name, stands on the Oder, and contains 380 houses, with 4500 inhabitants. It is surrounded with walls, and defended by a castle; and it has some trade in linen, in timber, and in ironmongery.

OPPIAN, a Greek poet, was born at Corycia or Anazarba, in Cilicia, towards the close of the reign of Marcus Aurelius. His father, Agesilas, held a distinguished rank in the senate of his native place, not so much on account of his birth or his riches, as the credit he obtained for the extent of his knowledge and his love of philosophy, which was the object of all his studies, and the guide of all his actions. To his son he was careful to give an education conformable to his own principles, causing him to be instructed in music, geometry, and particularly the belles-lettres. The young Oppian, however, had scarcely completed his studies, when an unlooked-for reverse damped his ardour, and destroyed all his hopes. Septimius Seve-

Oppeln
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Oppian.

Oppian. rus, having mounted the throne, to which he had succeeded in hewing out a way with his sword, arrived at Anazarba, and immediately the senate of the place threw themselves at the feet of the conqueror. Agesilas alone, conceiving himself bound to withhold from an usurper the homage which was due only to the legitimate sovereign, stood aloof upon this occasion; a circumstance which so irritated Severus, that he deprived the philosopher of all his property, and banished him to the island of Melitus, now *Meleda*, situated in the Adriatic. Thither Oppian followed his father, and it was in this compulsory retreat that he conceived and executed his two poems on the Chase and on Fishing, entitled *Cynegetica* and *Halieutica*. When they were finished, he went to Rome, and presented them to the son of Severus, Antoninus Caracalla, who relished them so much that he permitted the author to demand of him whatever recompense he pleased. Oppian asked only for the release of his father, with permission to the latter to return to his own country; and the emperor, as much touched with the filial affection of the son as he had been delighted with the verses of the poet, not only granted the favour he had asked, but added the gift of a gold statera (about L.1. 4s. of our money) for each one of the verses which he had just heard recited. If, as Suidas pretends, these verses amounted to twenty thousand, never did poet receive so splendid a recompense. But Oppian did not long enjoy his good fortune. Scarcely had he returned to his own country when he sunk into the grave, at the early age of thirty, having fallen the victim of a contagious malady which then desolated the city of Anazarba. His fellow-citizens erected to his memory a magnificent tomb, whereon was engraved an inscription in Greek verse, which Lorenzo Lippi has rendered as follows:

Oppianus vatum decus immortale fuissem,
Invida ni gelidum rapuisset Parca sub Orcum,
Me juvenem placidae clarum splendore Camænae,
Si livor longæ violasset tempora vitæ,
Non mihi laude parem quemquam terra alma tulisset.

This is all that we learn of Oppian from the anonymous Greek historian of his life, whom all the succeeding biographers have faithfully copied. We must, however, except the learned editor of his works, Schneider, who, being struck with the disparity of style which he remarked in the poems on the Chase and on Fishing, conceived that two works, which, according to him, were so different in merit, could not possibly have been the productions of the same author. Accordingly, he supposed that there were two Oppians, the first of whom, a native of Cilicia, and author of the *Halieutica*, preceded the second by several years. In the opinion of Schneider, it is to the latter that we are indebted for the *Cynegetica*, in which the author has, according to him, attempted to reproduce, but with great inferiority of talent, the manner and some of the imagery of the first Oppian. M. Belin de Ballu has, however, completely refuted this bold hypothesis, in the preface to his Greek edition of the *Cynegetica*, published at Strasburg in 1786. How, indeed, could it be reconciled with the unanimous concert of praise which critics, ancient and modern, have lavished upon this poet? John Tzetzes calls him a model of grace; J. C. Scaliger compares him to Virgil, in point of numbers, harmony, and elegance of style; Gaspar Barth, Conrad Gesner, and many others, never cite him except to couple his name with laudatory epithets. It is

not easy, however, to reconcile so much praise bestowed on the one hand, and so little regard evinced for the works of Oppian on the other; nor can we help feeling some astonishment, when we consider that, from the date of the *editio princeps*, printed at Florence in 1515, two centuries elapsed before the appearance of the first really critical edition, published by Schneider in the year 1777. During this long period, it is true, there appeared several editions at considerable intervals, particularly that of Aldus, Venice, 1517, which Schneider considers as very defective, and regards as the source of all the faults which, till his time, had disfigured the text; that of Vascosan, Paris, 1549; and that of Rittershusius, Leyden, 1597. No edition appeared in the seventeenth, nor any in the eighteenth century, until the year 1777, when that of Schneider was published at Strasburg, containing the Greek text, accompanied with a Latin translation, and followed by the paraphrase in prose which the sophist Eutechnius had made of the *Ixeutica*, another poem attributed to Oppian, but which, unfortunately, has not come down to our time. This was followed by the edition of Belin de Ballu, published at Strasburg in 1786, but containing only the *Cynegetica*, of which the editor published, at the same place, the following year, a good French translation, enriched with critical notes, and a curious extract from El Domai's history of animals, translated from the Arabic by Baron Silvestre de Sacy, who, however, for some reason, withheld his name. Prior to this there were two French translations, one by Florent Christian, preceptor to Henry IV. when prince of Bearn; and another by Fermat, a counsellor of Toulouse, who, in 1690, published a prose version of the books on Hunting by Arrian and Oppian. The poem on Fishing was translated into English heroic verse by Jones and others, belonging to St John's College, Oxford, and printed there in 1722, 8vo, with a life of the author prefixed. The Latin translation of Lorenzo Lippi, printed in 1478, preceded by thirty-seven years the *editio princeps* of the Greek text. (A.)

OPPIDO, a city of Italy, in the province of Calabria Ulteriore I., in the kingdom of Naples. It stands on a hill between the rivers Modena and Trecosio, is the see of a bishop, and contains a cathedral and three other churches, with 6000 inhabitants. It suffered most severely in the earthquake of 1783, when nearly one half of the population was destroyed.

OPILATION, in *Medicine*, the act of obstructing or stopping up the passage of the body, by redundant or peccant humours. This word is used chiefly to denote obstructions in the lower intestines.

OPOUN, the most easterly of the Navigators' Islands, in the South Pacific Ocean. Long. 169. 7. W. Lat. 14. 7. S.

OPTATIVE MOOD, in *Grammar*, that which serves to express a desire or wish for something. In most languages, except the Greek, the optative is expressed by prefixing to the subjunctive a conjunction, which, with the verb, expresses the thing wished for, leaving the mind to supply the verb indicative of desire; as *utinam sapires*, "that you were wise," or, in other words, "*I wish* that you were wise."

OPTIC ANGLE, the angle which the optic axes of both eyes make with one another, as they tend to meet at some distance before the eyes.

OPTIC AXIS, the axis of the eye, or a line going through the middle of the pupil and the centre of the eye.

Oppido
||
Optic Axis.

OPTICS.

History. OPTICS, from the Greek word *ὀπτική*, which signifies to see, is the name given to that branch of natural philosophy which treats of the nature and properties of light; of the changes which it suffers either in its qualities or in its course when transmitted through bodies, when reflected from their surfaces, or when passing near them; of the structure of the eye, and the laws of vision; and of the construction of those instruments in which light is the chief agent.

HISTORY.

The early history of optics, like that of all the sciences cultivated in ancient times, is involved in much obscurity. After the art of glass-making was discovered, lenses and spheres of glass seem to have been used as burning-glasses. In Aristophanes's comedy of *The Clouds* a burning sphere is distinctly described. Pliny speaks of globes of glass which produced combustion when held to the sun. Lactantius informs us that a globe of glass full of water could, when exposed to the sun, kindle a fire even in the coldest weather. And it appears that globes of glass were used by the Vestal Virgins to kindle the sacred fire, and by surgeons to burn the flesh of sick persons that required to be cauterised.

Among the earliest speculators on vision were Pythagoras and Plato; the former held that bodies became visible by means of particles projected from their surfaces and entering the eye, while the latter, in order to give the eye some share in the matter, supposed that something emitted from the eye met with something emitted from the object, and was again returned into the organ of vision. The followers of Plato, however, though they had deteriorated rather than improved the conclusion of Pythagoras, were acquainted with two important facts in the science. They taught that light moved in straight lines, and that when it was reflected regularly from the surfaces of polished bodies the angle of incidence was equal to the angle of reflexion.

The earliest writer on optics was Euclid, the celebrated geometer, whose treatise on the subject is still extant.¹ It consists of two books on optics and catoptrics, and proceeds on the Platonic theory, that the visual rays pass from the eye to the object, forming a cone whose apex is in the eye and whose base is the object. He shews that the angles of incidence and reflexion are equal, and that the incident and reflected rays lie in a plane at right angles to the reflecting surface; and he discusses the apparent magnitude and form of objects, and the apparent place of the images formed by reflexion from plane, convex, and concave mirrors. The book on optics contains sixty-one, and that on catoptrics thirty-one theorems.²

As a naturalist Aristotle made some valuable optical observations. He described, with tolerable correctness, the phenomena of rainbows, halos, and parhelia. He considered the rainbow as produced by the reflexion of the sun's rays from the drops of rain which gave an imperfect image of the sun; and he ascribes the light which appears in the sun's absence to the reflective power of the atmosphere.

The speculations of Seneca and Cleomedes derive any interest they may possess from their absurdity. Seneca noticed the magnifying power of a bottle of glass in enlarging small letters, and he observed that an angular piece of glass produced all the colours of the rainbow. Cleomedes, in his cyclical theory of motion, has given an elaborate explanation of the manner in which rays proceeding from the eye render the objects which they meet visible, but it is too stupid to demand the slightest attention.

The science of optics may be justly considered as owing its origin to the celebrated Claudius Ptolemy, the astronomer of Alexandria, who flourished at the end of the first century. His work entitled *Ptolemæi Opticorum Sermones quinque ex Arabico-Latine versi*, was known in the time of Roger Bacon to have treated on astronomical refractions, but it had escaped the notice of philosophers, and its valuable contents were unknown until 1816, when Delambre published an analysis of it from the manuscript in the Royal Library at Paris. Montucla had, long before the discovery of the French manuscript, mentioned that a manuscript copy of Ptolemy's Optics was in the catalogue of the Bodleian Library of Oxford. This interesting manuscript, which Professor Rigaud was so kind as to examine at our request, belongs to the Savilian Library, and had been the property of Sir Henry Savile himself. As in the Parisian manuscript the first book is wanting, but it has no blank spaces like the Parisian one, and it is accompanied with a preface by the translator, containing an abstract of the work, and stating that the fifth book is imperfect. The translator mentions that the second book had been previously translated from Arabic into Latin by Amiratus Eugenius, a Sicilian, from the latest of two copies of which, the new translation was made. The following abstract of this interesting work is taken from Delambre's Analysis, and from the translator's abstract as communicated to us by Professor Rigaud.

"The Optics of Ptolemy consists of five books. The first book is wanting, but from the recapitulation of it at the beginning of the second, it appears to have contained a dissertation on the relations between light and vision, founded on the idea that the visual rays issue from the eye. In the second book he shews that we see better with two eyes than with one, and that the object is not seen in the same place with one eye as with two. Vision, he says, is single, if the two axes of the pyramids of the visual rays are directed in the same manner on the object, but becomes double if the axes are not directed in a similar manner, and if the distance is a little less than the distance between the eyes. He next proceeds to find, geometrically, the circumstances which produce single or double images. He ascribes imperfection of sight in old men to a want of the visual virtue, which, like the other faculties, decays with the approach of age; and he states that those who have *concave* eyes see at a less distance than those who have not such eyes. Rapidity of motion, he asserts, confounds the colours on a wheel. If the colour is in the direction of a radius the wheel will appear entirely of this colour, and if different colours are at different distances from the centre, these will

¹ Euclidis *Optica et Catoptrica* nunquam antehac Græce edita. Eadem Latine reddita per Joannem Penam, Regium Mathematicum. His præposita est ejusdem Joannis Penæ de usu optices prefatio, ad illustrissimum principem Carolum Lotharingum Cardinalem. Parisiis, 1557.

² Dr. Smith is of opinion that this treatise was not written by Euclid the geometer; an opinion which he rests on the number of blunders which the author has committed. Smith's *Optics*, vol. ii. Rem. p. 16. § 93.

History. appear on the wheel as so many concentric circles differently coloured. When, after looking long at a coloured object, we direct the eye to another, we attribute to it the colour of the first.

"In the *third* book, which treats of reflexion from plane and concave mirrors, he shews, that in a plane mirror the object is seen in the perpendicular, drawn from the object to the plane of the mirror and continued behind it. He mentions that objects appear smaller towards the zenith and larger towards the horizon, because in the former case we see them in a position to which we are less accustomed.

"In concave mirrors the objects appear concave, and in convex ones they appear convex, and the image is seen at the point of intersection of the reflected ray, and the line drawn from the object to the centre of the sphere.

"The *fourth* book treats of concave and compound mirrors, and of the effects of two or more mirrors. In these mirrors an object may be reflected and rendered visible by all the parts of the mirror, or by three, or two, or even one point. The image may be either on the surface of the mirror, or before the surface, or behind the eye, or behind the mirror. When the image is behind the mirror, the distance of the object from the mirror is less than that of the image. When the image is between the eye and the mirror the distance of the object from the eye will be sometimes greater than the distance of the image from the mirror, and sometimes it will be equal to it, and sometimes less. When the object is between the mirror and the eye it will be seen in a part different from that where it really is; and if we give it a motion in one direction it will appear to move in the opposite direction.

"The *fifth* book is the most curious and valuable of the whole work. Ptolemy begins by explaining the experiment with the piece of money, which, when concealed behind the side of a vessel, becomes visible by filling it with water. The refraction of the visual ray in penetrating the water makes us see the piece of money out of its place, and in the prolongation of the primitive direction of the ray emitted from the eye. In order to measure this refraction at different angles, Ptolemy employs a circle divided into 360°, the inferior half of which is plunged in the water, so that the refracting surface covers one of the diameters of the circle. The centre of the circle is marked by a small coloured body, and a second similar body is fitted to one of the quadrants out of the water, and at a given distance from the vertical diameter; a third coloured body slides on the lower part, which is immersed in the water. This last body is then pushed with a rod till the eye placed on the body in the air sees all the three in a straight line. The two distances of the second and third body from the vertical diameter are thus measured on the graduated circle.

"In this manner Ptolemy obtained the results in the following table, which contains the angles of refraction from *air* to *water* from 10° up to 80° of incidence.

Angles of incidence.	Angles of refraction.	Ratio of the sines of the angles of incidence and refraction.
0°.....	0° 0'	
10	8 0	1 to 0.80143
20	15 30	1 — 0.78136
30	22 30	1 — 0.76537
40	28 0	1 — 0.73037
50	35 0	1 — 0.74875
60	40 30	1 — 0.76992
70	45 0 ¹	1 — 0.75249
80	50 0	1 — 0.77786

The mean of these ratios is 0.76736, differing little from the

correct one, viz. 0.7486; and it is interesting to remark, that at an incidence of 40° and 50, where the angle of refraction can be measured most accurately, the results of Ptolemy approach very near to the truth.

"In order to measure the angles of refraction from air into glass, Ptolemy adopted the ingenious idea of procuring a semi-cylinder of pure glass, and adjusting the diameter of it so as to coincide with the horizontal diameter of the graduated circle already described. By performing the very same experiments which he made with water, he found that there was no refraction at a perpendicular incidence; but that for every other position the angle in the air was always greater than the angle in the glass, and the refraction greater than in water. When the three bodies were placed in appearance in the same straight line they always remained there, whether the eye was placed above the glass or below it. The following are the refractions from *air* to *glass* which he obtained in this manner:—

Angles of incidence.	Angles of refraction.	Ratio of the sines of the angles of incidence and refraction.
0°.....	0° 0'	
10	7 0	0.70179
20	13 30	0.68255
30	20 30 ²	0.70041
40	25 0	0.65748
50	30 0	0.65270
60	34 30	0.65403
70	38 30	0.66247
80	42 0	0.67946

The mean of these ratios is 0.67386, whereas the true ratio is 0.64516; but at the angles of incidence of 40°, 50°, and 60°, the ratio is very near the true one.

When the semi-cylinder of glass was placed on the surface of water, Ptolemy observed that the refractions from water into glass were less than any he had observed, because the difference of density between *water* and *glass* was less than between *water* and *air*. The following were the results which he obtained:—

Angles of incidence.	Angles of refraction.	Ratio of the sines of the angles of incidence and refraction.
0°.....	0° 0'	
10	9 30	0.95044
20	18 30	0.92774
30	27 0	0.90778
40	35 0	0.89233
50	42 30	0.88192
60	49 30	0.87804
70	56 0	0.88422
80	62 0	0.89657

The mean of these ratios is 0.90, the true ratio being 0.8760, the index of refraction for water being 1.336, and that of glass 1.525; but at the angles of incidence of 50°, 60°, and 70°, the ratio is very near the true one.

Ptolemy now discusses the important subject of astronomical refraction, which he ascribes to the difference of density between ether and air. If the visual ray, he remarks, is stopped by an impenetrable body, it could not shew us a body which is hid behind the first; and if the second becomes visible, it can only be on account of the flexion of the visual ray. This flexion takes place at its passage into a medium of different density; and the possibility of this flexion, he asserts, may be proved by the following phenomena. By observations on the stars, it was found that the parallels drawn through the apparent place of those which rise or set, are those nearer the north pole than the paral-

¹ This is 45° 30' in the Oxford manuscript.

² In the Oxford MS. this is 18° 30'. Professor Rigaud supposes the real number to have been 19° 30'.

History.

lens which pass through their apparent place when they are in the meridian; and the nearer the stars are to the horizon, the greater is the approach of their parallels to the pole. By observing a circumpolar star, Ptolemy found that it was nearer the pole in its lower passage across the meridian; but when it was near the zenith, its parallel became greater in appearance, whereas in the first case it became smaller. Hence it follows that refraction raises the stars towards the zenith. In order to explain the manner in which refractions operate, Ptolemy makes use of the same figure upon which Cassini has since founded his theory. He employs almost the same reasoning in order to determine the quantity of the refraction. He remarks, that the more a star is elevated, the less will be the difference between its true and its apparent place, and that this difference will be nothing in the zenith, because a perpendicular ray experiences no flexion. He demonstrates by a figure, that in every case the refraction carries the star towards the zenith; and he states that the height of the atmosphere is unknown, but that it must begin below the sphere of the moon. From this general account of the fifth book of the Optics of Ptolemy, it will be seen that he gives a theory of astronomical refractions much more complete than that of any astronomer before the time of Cassini.

These important results, which, without any other assistance, would have enabled the optician to trace the progress of the rays of light through lenses of all forms, were not applied as they might have been, to extend the boundaries of the science. Banished from Europe, optics, along with the other sciences, found shelter in Arabia; and after a period of a thousand years, it was destined to receive fresh accessions in that favoured country.

Alhazen.
A.D. 1100.

Alhazen, who flourished about the end of the eleventh century, was the individual who gave this fresh impulse to optical science.¹ He establishes the opinion of Pythagoras, that vision is performed by rays which proceed from the object to the eye; and he states that vision is not completed till the ideas of external objects are conveyed by the optic nerves to the brain; and after a description of the eye and its parts, he assigns to each of them the function which it performs in vision. He maintains that we see objects singly with two eyes, because we must perceive only one image when it is formed on corresponding parts of the retina. The instrument employed by Alhazen for measuring the angle of refraction, is more complex than that used by Ptolemy, and his knowledge of the refraction of the atmosphere and of fluids, is obviously inferior to that of the Alexandrian philosopher. Alhazen ascribes to refraction the twinkling of the stars, and the contraction of the diameters and distances of the heavenly bodies; and it follows from his method of reasoning, that refraction elevated the stars towards the pole and not towards the zenith, as had been sagaciously ascertained by Ptolemy. Alhazen has described seven species of mirrors, and he was the first person who determined the focus of rays after reflexion, when the place of the object is known. He has treated largely of optical illusions, whether produced in direct or in refracted and reflected vision; and he ascribes the size of the horizontal moon to the apparent form of the concavity of the sky, which is imagined to be more remote in the horizon than any where else. Alhazen likewise observed that objects were magnified when held close to the plane wall of the larger segments of a glass sphere; and he has given rules, which are far from being correct, for determining the apparent size of objects when seen through such spheres.

Vitello.
A.D. 1270.

The next cultivator of optics was Vitello, whose work was

first published at Nuremberg in 1535.² He made a series of experiments on the angles of refraction of water and glass, which apparently exceeded those of Ptolemy in correctness, the mean ratio of the sines being nearer the truth, and the ratio for each angle of incidence coinciding more accurately with the mean ratio. The following are the results he obtained with water:—

Angles of incidence.	Angles of refraction.	Ratio of the sines.
0°	0° 0'	
10	7 45	0.77658
20	15 30	0.78135
30	22 30	0.76537
40	29 0	0.75423
50	35 0	0.74875
60	40 50	0.74992
70	45 30	0.75904
80	50 6	0.77787

The mean of these ratios is 0.76414, whereas that obtained by Ptolemy was 0.76736, and the true ratio (the index of refraction being 1.3358), 0.7486. The results for 30° and 60° are exactly the same as Ptolemy's.

The following were the measures obtained by Vitello for glass:—

Angles of incidence.	Angles of refraction.	Ratio of the sines.
0°	0° 0'	
10	7 0	0.70179
20	13 30	0.68255
30	19 30	0.66761
40	25 0	0.65748
50	30 0	0.65270
60	34 30	0.65403
70	38 30	0.66247
80	42 0	0.67946

The mean of these ratios is 0.66976, whereas that obtained by Ptolemy is 0.68736, and the true ratio 0.64516.

In comparing this last table with the similar one given by Ptolemy, we cannot fail to be struck with their entire similarity, with the single exception of the angle of refraction at 30° of incidence, which Vitello makes 19° 30', and Ptolemy, in the Paris copy, 20° 30'. Now, in the Oxford manuscript, the numbers are 18° 30'; and Professor Rigaud conjectures that the real number has been 19° 30', the same as Vitello's. Hence we cannot on any just grounds regard the measures of refraction given by the Polish philosopher as any thing else than those of Ptolemy, from whom he must have borrowed them.

By comparing the two tables for water, we are inclined to make the same unfavourable supposition. The refraction for 20°, 30°, and 50° of incidence are exactly the same in both; and Vitello's measure for 70°, viz. 45° 30', is the same as Ptolemy's in the Oxford manuscript.

But this opinion is converted into certainty when we examine Vitello's table of the refractions from water into glass, in which all the measures are *identically* the same with those of Ptolemy.

In the course of his experiments, Vitello was led to observe that whenever light was reflected or refracted by transparent bodies, a certain portion of it was lost, but he does not estimate the quantity, contenting himself with the observation that bodies always appear less luminous when seen by refracted and reflected light. In treating of the cause of the rainbow, he shews that refraction is as neces-

¹ Montucla has very incorrectly charged Alhazen with borrowing the greater part of his optics from Ptolemy. Delambre has refuted this opinion, and rendered it probable that the Arabian philosopher never saw the work of Ptolemy. What assistance he obtained from his predecessors who flourished after Ptolemy cannot now be ascertained. See *Connaissance des Temps* for 1816.

² This work has been very erroneously regarded as little more than a translation of Alhazen's treatise.

History. sary to its production as reflexion, but he of course does not ascribe the colours to refraction, regarding it merely as a means of giving strength or condensation to the solar rays. He imitated the colours of the rainbow, (which, like Seneca, he considers as having their origin in a mixture of the sun's rays with the blackness of the cloud), by placing a white piece of paper beneath a circular vessel of glass containing water; but he says that they are not the same colours with those of the rainbow, because they are not in the same number, and do not reach the eye after reflexion. He shews that in those countries where the meridian altitude of the sun exceeds the semi-diameter of the rainbow, a rainbow cannot be seen at noon. His observations on the foci of glass spheres, on the twinkling of the stars, and on other optical phenomena, are of no value, and rather tend to confirm the severe censures which Baptista Porta has pronounced upon his scientific character.

Passing over archbishop Peckham's treatise on optics, entitled *Perspectiva Communis*, as containing nothing either new or important, we come to consider the claims of Roger Bacon to the invention of the microscope and the telescope.

Roger Bacon. Born 1214. In his *Opus Majus*, which embraces his *Perspectiva* and *Specula Mathematica*, he has given an account of his speculations and inventions in optics. Dr. Plott, Dr. Friend, Dr. Henry, Wood, Muschenbroek, Jebb, and William and Samuel Molyneux have agreed in regarding Bacon as the inventor of the telescope, while Dr. Smith of Cambridge is of opinion that he wrote only *hypothetically*, and had never made any experiments with real lenses. As this is not the place to discuss this subject in a critical manner,¹ we shall content ourselves with giving a single extract respecting the telescope and microscope.

"Greater things than these may be performed by refracted vision. For it is easy to understand by the causes above mentioned, that the greatest things may appear exceeding small, and on the contrary; also that the most remote objects may appear just at hand, and on the contrary. For we can give such figures to transparent bodies, and dispose them in such order with respect to the eye and the objects, that the rays shall be refracted and bent towards any place we please; so that we shall see the object near at hand, or at a distance, under any angle we please. And thus from an incredible distance we may read the smallest letters, and may number the smallest particles of dust and sand, by reason of the greatness of the angle under which we may see them; and on the contrary, we may not be able to see the greatest bodies just by us, by reason of the smallness of the angles under which they may appear; for distance does not affect this kind of vision, excepting by accident, but the quantity of the angle. And thus a boy may appear to be a giant, and a man as big as a mountain, forasmuch as we may see the man under as great an angle as the mountain, and as near as we please; and thus a small army may appear a very great one, and, though very far off, yet very near us, and on the contrary. Thus also the sun, moon, and stars may be made to descend hither in appearance, and to appear over the heads of our enemies; and many things of the like sort, which would astonish unskilful persons."

Whether these remarks were the result of speculation or of actual experiment, it is not easy at this distance of time to determine; but in opposition to the opinion of Dr. Smith, we may adduce a passage from Recorde's *Pathway to Knowledge*, printed in 1551, in which he distinctly speaks of a glasse used by friar Bacon. "Great talke there is of a glasse he made at Oxford, in which men might see things that weare don, and that was iudged to be don by power of euill spirites. But I know the reason of it to be good and natu-

ral, and to be arright by geometry (with perspective as a part of it), and to stand as well with reason as to see your face in a common glass."

On the authority of various passages in the writings of Invention friar Bacon, Mr. Molyneux is of opinion that he was acquainted with the use of spectacles, and when Bacon says that "this instrument (a plano-convex glass, or large segment of a sphere), is useful to old men, and to those that have weak eyes; for they may see the smallest letters sufficiently magnified," we are at least entitled to conclude that the particular way of assisting decayed sight which he describes was known to him, though he may not have used his segment of a glass sphere in looking at objects separated by an interval from its plane side. But whether spectacles were in use or not in Bacon's time, it is quite certain that they were known and used about the time of his death, which happened in 1292. Alexander de Spina, a native of Pisa, who died in that city in 1313, having seen a pair of spectacles made by some other person, who was unwilling to communicate the secret of their construction, got a pair made for himself, and found them so useful, that he cheerfully made the invention public. M. Spoon,² to whom we are indebted for this fact, fixes the date of the invention between 1280 and 1311. Signior Redi, from whom Spoon quotes the preceding fact, states that he possesses a manuscript written in 1299, *Di Governo della Familia de Scandro di Pissozzo*, in which the author says, "I find myself so pressed by age, that I can neither read nor write without those glasses they call spectacles, lately invented, to the great advantage of poor old men, when their sight grows weak." It is stated also in the Italian Dictionary *Della Crusca*, under the head of *Occhiale* or *Spectacles*, that friar Jordan de Rivalto, who died at Pisa in 1311, tells his audience, in one of his sermons, which were published in 1305, "that it is not twenty years since the art of making spectacles was found out, and is indeed one of the best and most necessary inventions in the world." Bernard Gordon, too, a celebrated physician of Montpellier, in his *Lilium Medicinæ*, published about 1305, recommends an eye salve as capable of making the patient read the smallest letters without spectacles; and Muschenbroek informs us that it is inscribed on the tomb of Salvinus Armatus, a Florentine nobleman, who died in 1317, that he was the inventor of spectacles.

Before we quit the period of Friar Bacon we must notice a claim to the invention of the telescope which has been made in favour of Leonard Digges, an Englishman, because this claim, whatever be its amount, supports undeniably the prior claim of Bacon. The claim of Digges is founded on passages in his *Pantometria* and *Stratitotikos*. The first of these works appeared at London in 1571, and a second edition of it, edited by his son Thomas Digges, Esq., was published in 1591. The *Stratitotikos* was published in 1579 and also in 1590. In the preface to the second edition of the *Pantometria*, Thomas Digges remarks: "My father, by his continuell painfull practices, assisted by demonstrations mathematical, was able, and sundrie times hath, by proportionall glasses, duely situate in conuenient angles, not onely discovered things farre off, read letters, numbred peeces of money, with the verve coyne and superscription thereof, cast by some of his freends of purpose upon downes in the open fields, but also seuen miles off declared what hath beene doone in priuate places."

In the twenty-first chapter of the first book, Leonard Digges himself says, "But marvellous are the conclusions that may be performed by glasses (mirrors) concave and convex, of circular and parabolic forms, using for multiplications of

¹ We must refer our readers to a series of able anonymous letters upon this subject, published in the *Philosophical Magazine*, vols. 18, 19.

² *Recherches Curieuses d'Antiquité*, dissert. 16.

History. beams, sometimes the aid of glasses transposed, which, by practice, should unite or dissipate the images or figures presented by the reflection of others. By these kind of glasses, or rather frames of them placed in due angles, yee may not only set out the proportion of an whole region, yea, represent before your eye the lively image of every house, village, &c., and that in as little or great space or plan as ye will presente; but also augment or dilate any parcell thereof, so that, whereas, at the first appearance a whole toun shall present itself so small and compact together that ye shall not discover any difference of streets, yee may, by application of glasses in due proportion, cause any peculiar house or room thereof dilate and shew itself in as ample form as the whole touns at first appeared, so that yee shall discern any trifle, or read any letter lying there open, especially if the sun beams may come into it, as plainly as if you were corporeally present, although it be distant from you as far as eye can discerie. But of these conclusions I mind not here more to introduce, having at large, in a volume by itself, opened the miraculous effects of perspective glasses."

Now it is a curious fact that Thomas Digges expressly says that his father's knowledge of optics "partly grew by the aid he had by one old written book of Bakon's Experiments, that by strange aduventure, or rather destinie, came to his hands."

In support of the opinion that the telescope was known in England more than forty years before 1609 or 1610, when it was supposed to have been invented in Holland, we may quote a passage or two from the celebrated John Dee's mathematical preface to Euclid, written at Matloke on the 9th of February 1570, the year in which it was published. "Is it not," says he, "greatly against the sovereignty of man's nature to be so overshot and abused with things before his eyes? things far off to seem neer, and neer to seem far off; small things to seem great and great to seem small; one man to seem an army, or a man to be constantly afraid of his own shadow; yea, so much to fear, that if you, being alone, near a certain glasse,¹ and profer with dagger or sword to foyne at the glasse, you shall suddenly be moved to give back by reason of an image appearing in the air between you and the glass, with like hand, sword, or dagger, and with like quickness foyning at your eye, likewise as you do at the glasse." He then mentions that such a glass was in the possession of a gentleman famous and honourable for his good service done to his country. Dee likewise speaks of having seen once or twice in company with Orontius at St. Denis in 1551; "The lively image of another man in the air aloft, walking to and fro or standing still;" but the most remarkable passage is that in which he speaks of the means of ascertaining the numbers of an enemy's army; "The herald, pursuivant, sergiant royall, captain, or whosoever is careful to come near the truth herein; besides the judgment of his expert eye, his skill of ordering tacticaly, the help of his geometrical instrument; ring or staffe astronomical, commodiously framed for carriage and use. *He may wonderfully help himself by perspective glasses*, in which I trust our posterity will prove more skilful and expert, and to greater purposes than in these days can be credited to be possible."

Maurolycus. A.D. 1525.

When polite learning began to revive in Europe some of the more abstract sciences began to be cultivated with success. Maurolycus, a teacher of mathematics at Messina, was particularly distinguished by his optical researches, of which he published an account in his *Theoremata de Lumine et Umbra* and his *Diaphanorum Partes, seu libri tres*. In the first of these works, which was completed in 1525, but not published till 1575, Maurolycus treats of the measure of light, or the illumination of bodies, and he particu-

larly explained the curious phenomenon which had been observed since the time of Aristotle, that when the sun shone through an aperture of any form, the figure of the aperture always appeared round, except when the sun was eclipsed, when it had the appearance of a crescent. He shews that each point of the aperture is the apex of two opposite cones of rays, one of which has the sun for its base, while the other, when cut by a plane at right angles to its axis, will produce a luminous circle, whose diameter will be proportional to the distance of the plane from the aperture. "Consequently if these images be taken at a considerable distance from the aperture, and therefore be pretty large when the aperture itself is small; since the whole image consists of a number of images, all of which are circular, the image of the sun formed by the aperture, of whatever form it be, must be circular also; and it will approach the nearer to a perfect circle the smaller is the aperture and the more distant the image." It may be easily shewn, indeed, that a small aperture acts like a lens in forming an inverted picture of all external objects in a dark chamber, and that then pictures become more distinct in their outline as the aperture becomes smaller. Hence the sun's image is round, or a crescent, according as the sun's disc is entire or eclipsed. In studying the phenomena of vision Maurolycus was very successful. He shews that the crystalline humour is a lens which collects the rays which enter the eye and converges them to foci on the retina; but he does not seem to have found that these foci depict an exact image or picture of the object upon the retina. Limited, however, as this discovery was, it enabled him to ascertain the cause of *long* and *short-sightedness*, the pencils in the former case coming to a focus before they entered the retina, and in the latter at points beyond the retina. Hence, as in both these cases, vision is indistinct either from a too early or a too late convergence of the rays, he concluded that concave glasses of suitable focus would relieve the short-sighted person, and convex glasses the long-sighted person.

The subject of the rainbow also occupied Maurolycus's attention. He found the diameter of the outer bow 42°, and that of the inner from 53° to 56°; but according to the theory which he adopted, namely that part of the sun's rays were partly reflected from the exterior of the drop, while the rest entered the drop and circulated within it by reflexion along the sides of an octagon; the diameters of the bow should have been 45° and 56°. Maurolycus supposed the colours of the rainbow to be *four*, namely, *orange*, (*crocus*), *green*, *blue*, and *purple*. Taking his *crocus* to be red, his enumeration in leaving out the yellow, as Dr. Wollaston did more recently, shew much accuracy of observation.² Maurolycus attempted to discover the law of refraction but without success. He supposed that the angle of refraction was always five-eighths of the angle of incidence, which is a tolerably correct estimate in the case of glass, but quite erroneous for bodies of low and high refractive powers.

Maurolycus may be considered as the first discoverer of the aberration of figure, in so far as he observed that the rays which were incident at a distance from the axis of a transparent sphere, had their focus nearer the sphere than those which were incident nearer the axis. This happy observation was the result of his having noticed the caustic curves formed by such spheres, which he justly described as arising from the continued intersections of the refracted rays.

While the Sicilian philosopher was making new and important discoveries a celebrated Neapolitan, Joannes Baptista Porta, was endeavouring to promote the interests of science, as an ardent collector of its stores, as well as an original inquirer into its mysteries. He established an Academy of Sciences

History.

Baptista Porta. Born 1547. Died 1615.

¹ By a glass, he means "any thing from which a beam reboundeth."

² The yellow which is in the sun's direct rays is observed when the sun's rays are reflected from the sky or from clouds.

History. which held its sittings in his own house, and which numbered among its members all the *virtuosi* in Naples. Each member was bound to contribute to the common stock something not commonly known, and in this way he obtained the materials for his *Magia Naturalis* which appeared in the year 1560,¹ when he was only about fifteen years of age. This work was speedily translated into French, Hebrew, Spanish, and Arabic, and went through numerous editions in different parts of Europe. The Papal court, viewed with jealousy the proceedings of a society which devoted so much energy to the spread of knowledge, and, though Baptista Porta was a Roman Catholic, the meetings of the academy were prohibited by the ecclesiastical power. Although Baptista Porta was well acquainted with the writings of his predecessors, yet the principal invention recorded in his *Natural Magic* is that of the camera obscura, which he seems to have brought to great perfection. He remarks, in the 17th chapter of this work, that if a small aperture is made in the shutter of a dark room, distinct images of all external objects will be depicted on the opposite wall in their true colours; and he further adds that if a convex lens be fixed in the opening, so that the images are received on a surface at the distance of its focal length, the pictures will be rendered so much more distinct that the features of a person standing on the outside of the window may be readily recognised in his inverted image. Various attempts seem to have been made to obtain an erect image of objects in the camera obscura, but the contrivances for this purpose had the effect, as Baptista Porta assures us, of making the pictures so obscure that there was no pleasure in viewing them. He observes, however, that the image may be best rendered erect by receiving it "upon a concave mirror properly adapted to the convex lens and held at a great distance from the hole." The effect of this expedient, he says, cannot be sufficiently admired. Baptista Porta applied his instrument to the representation of eclipses of the sun, and of hunting scenes, battles, and other events produced by moveable pictures and drawings. In this way he magnified small objects and drawings, and produced the effects of the magic lantern by the light of the sun in place of that of a lamp. He considered the eye as a camera obscura, the pupil as the hole in the window contracting and dilating with different lights, and the crystalline lens as the principal organ of vision, though he seems to have regarded it not as his convex lens but as the tablet on which the images of external objects were formed, the cornea being, no doubt, in his estimation, the part of the eye which formed the picture. Baptista Porta was doubtless acquainted with what may be called the simplest form of the refracting telescope, namely, that in which a convex lens is the object-glass, and the eye placed six inches behind its focus, the eye-glass. He found that when his eye was thus placed behind a convex lens, he could read a letter which he could not read with his naked eye. His lens must have exceeded in focal length, the distance at which his eye saw distinctly, for the magnifying power of such a telescope is equal to the focal length of the object-glass divided by that distance.

In another place Porta, after mentioning the effects produced by a concave and a convex lens separately, remarks, "that if you knew how to combine one of each sort rightly, you would see both far and near objects larger and more clearly." "If Porta," says Mr. Drinkwater Bethune, in his admirable life of Galileo, "had stopped here, he might more securely have enjoyed the reputation of the invention, but he then professes to describe the construction of his instrument, which has no relation whatever to his previous remarks." "I shall now endeavour to shew in what manner we may contrive to recognise our friends at the distance of several miles, and how those of weak sight may

read the most minute letters from a distance. It is an invention of great utility, and grounded on optical principles, nor is it at all difficult of execution; but it must be so divulged as not to be understood by the vulgar, and yet be clear to the sharp-sighted." The description which follows, seems far enough removed from the apprehended danger of being too clear; and indeed every writer who has hitherto quoted it, has merely given the passage in its original Latin, apparently despairing of an intelligible translation. With some alterations in the punctuation, which appear necessary to bring it into any grammatical construction, it may be supposed to bear something like the following meaning:—"Let a view be contrived in the centre of a mirror, where it is most effective. All the solar rays are exceedingly dispersed, and do not in the least come together (in the true centre); but there is a concourse of all the rays in the central part of the said mirror, half way towards the other centre, where the cross diameters meet. This view is contrived in the following manner: A concave cylindrical mirror placed directly in front, but with its axis inclined, must be adapted to the focus; and let obtuse angled, or right angled triangles be cut out with two cross lines on each side drawn from the centre, and a glass (*specillum*) will be completely fit for the purposes we mentioned." If it were not for the word *specillum*, which, in the passage immediately preceding this, Porta contrasts with *speculum*, and which he afterwards explains to mean a glass lens, it would be very clear that the foregoing passage, supposing it to have any meaning, must be referred to a reflecting telescope; and it is a little singular, that whilst this obscure passage has attracted universal attention, no one, so far as we are aware, has taken any notice of the following unequivocal description of the principal part of Newton's construction of the same instrument. It is in the fifth chapter of the seventeenth book, where Porta explains by what device exceedingly minute letters may be read without difficulty. "Place a concave mirror so that the back of it may lie against your breast; opposite to it and within the burning point, place the writing; put a plane mirror behind it, that may be under your eyes. Then the images of the letters which are in the concave mirror, and which the concave has magnified, will be reflected in the plane mirror, so that you may read without difficulty."²

On these grounds Porta claimed for himself the invention of the telescope; and his death which took place in 1615, at the age of eighty, is said to have been hastened by the exhaustion of writing a work on that instrument.

At a more advanced age, Baptista Porta composed another work entitled, *De Refractione Optices parte, libri novem*, which appeared in 1593, but contains nothing that is deserving of particular notice.

The subject of the rainbow, which had hitherto been a *questio vexata* among philosophers, now began to excite notice, as much from the absurdity of the theories which were advanced to explain it, as from the native interest of the subject. Clichtoveus, whom Dr. Priestley supposes to be the person who distinguished himself by his opposition to Luther, had maintained that the second rainbow was a reflected image of the first, not only from the faintness of its light, but from the inversion of its colours; an opinion which our celebrated countryman, Dr. Gilbert has justly ridiculed, alleging, that the whole form of the bow ought to be inverted as well as its colours, and that it ought to have its convex side downwards.

A more correct theory of the rainbow was about this time proposed by J. Fleschier of Breslau, in his treatise entitled, *De Iridibus doctrina Aristotelis et Vitellionis*, which was published in 1571. He supposes the rays to suffer two refractions, one on entering, and the other on emerging

¹ A second and greatly enlarged edition was published about thirty years afterwards. ² *Life of Galileo*, Libr. Useful Knowledge, p. 21. VOL. XVI.

History. from the drop, but after one ray had thus been separated into a coloured beam by these refractions, he supposed that this beam was reflected to the eye from another drop.

De Domi- These views, imperfect as they are, paved the way for
nis. Born the true theory of the rainbow. Antonio de Dominis, arch-
1561. Died bishop of Spalatro, first broached this theory in his treatise
1662. *De Radiis Visus et Lucis*, which was published in 1611. He justly asserts that two refractions in a drop of water, and one intermediate reflection, were sufficient to bring back to the eye of the spectator the rays of light by which the bow was formed. An experiment with a globe of glass enclosing water, either suggested to him or confirmed this opinion. In following out this experiment, however, our author committed several mistakes. He explained the exterior bow by the same number of refractions and one reflexion, but he supposed that the rays which formed it were returned to the eye by a part of the drop lower than that which transmitted the red of the interior bow. In addition to this mistake, he supposed that the rays which went to form one of the bows, came from the upper part, and that which went to form the other bow from the under part of the sun's disc. Notwithstanding these mistakes, De Dominis is entitled to be regarded as the true discoverer of the cause of the primary rainbow.

The treatise containing these discoveries was not published till after the use of the telescope by Galileo, but Bartolo, who published it, informs us in the preface, to use the words of the author of the *Life of Galileo*, "that the manuscripts was communicated to him from a collection of papers written twenty years before, on his enquiring the archbishop's opinions with respect to the newly discovered instrument, and that he got leave to publish it, 'with the addition of one or two chapters.' The treatise contains a complete description of a telescope, which, however, is proposed merely to be an improvement on spectacles; and if the author's intention had been to interpolate an after-written account in order to secure to himself the undeserved honour of the invention, it seems improbable that he would have suffered an acknowledgment of additions, previous to publication, to be inserted in the preface. Besides, the whole tone of the work is that of a candid and truth-seeking philosopher, very far indeed, removed from being, as Montucla calls him, conspicuous for ignorance even among the ignorant men of his age. He gives a drawing of a convex and concave lens, and traces the passage of the rays through them; to which he subjoins, that he has not satisfied himself with any determination of the precise distance to which the glasses should be separated according to their convexity and concavity, but recommends the proper distance to be found by actual experiment, and tells us that the effect of the instrument will be to prevent the confusion arising from the interference of the direct and refracted rays, and to magnify the object by increasing the visible angle under which it is viewed."¹

From the great liberality of his sentiments, and his conversion to the protestant faith, this eminent ecclesiastic was obliged to leave Italy, and to take refuge in London, in 1616, where he lived some years. Having been induced to return to Italy, his imprudence exposed him to new persecutions, and having been imprisoned by Urban VIII. he died of poison in the prison of the Inquisition. Sentence was passed upon him after his death, and his body, with all his books and papers were publicly burnt in the Campo de Fero, in the year 1624.

Invention of the tele- We now approach the time when the telescope was un-
scope. questionably invented. We have no doubt that this invaluable instrument was invented by Roger Bacon or Baptista Porta, in the form of an experiment, though it perhaps had not in their hands assumed the maturity of an instrument

History. made for sale, and applied to useful purposes both terrestrial and celestial. If a telescope is an instrument by means of which things at a distance can be seen better than by the naked eye, then Baptista Porta's concave lens with his eye looking at the image which it formed, and reading a letter too remote to be otherwise legible, was a real telescope; but if we give the name to a tube having a convex object glass at one end, and a convex or a concave lens at the other, placed at the distance of the sum or the difference of their focal lengths, then we have no distinct evidence that such an instrument was used before the beginning of the seventeenth century.

In his *Treatise on Dioptrics*, Descartes has ascribed the Metius. invention of the telescope to James Metius, a citizen of Alkmaer in Holland; but Huygens in mentioning this claim² says, that "to his certain knowledge telescopes were made before this, at Middleburg in Zealand, about the year 1609, either by John Lippersheim, whom Sirturus mentions, or by Zacharias (Jansen), whom Borellus makes the first inventor of them in his book *de Vero Telescopii inventore*. The telescope which they made did not exceed a foot and a half long. But much earlier than both, Joannes Baptista Porta a Neapolitan, had delivered the rudiments of this art in his book on dioptrics and natural magic, published fifteen years before telescopes appeared in our Belgium. In these books he speaks of his *specilla* as shewing things placed at a distance as if they were nigh, and also of the construction of concave and convex lenses. But that he made no great progress in this art is hence evident, that in all that time it did not become famous; and that he did not discover any of those things in the heavens that were observed afterwards. And this shews that his invention was not owing to his skill, but to some accidental experiments. For though he had some degree of knowledge in mathematicks, yet he did not understand those fundamental principles and abstruse theorems in dioptricks, that are necessary to invent a telescope by reason; and by much less did those illiterate mechanicks that I mentioned before. But no wonder that good luck and casual experiments should produce this effect; after spectacles and concave glasses, for defective eyes of both sorts, had been commonly used for above three hundred years, it is rather surprizing that so obvious a thing should be so long unknown."

In this passage Huygens leaves the claims of his two Dutch friends on the same level; but though Borellus adopts the conclusion that Jansen was the inventor, yet it has been ingeniously suggested, that Jansen's claim as the inventor of the microscope, has been mixed up with the invention of the telescope, on the evidence adduced by Borellus. On this hypothesis Lippersheim is supposed to have invented the telescope by accident in 1609, and that Jansen possessing an instrument so like it, had been able, after hearing of Lippersheim's contrivance, to make a similar instrument without having seen the telescope of his rival.³

Much light has recently been thrown on the history of Lippershey. the telescope by Professor Moll, who has discussed the claims of the various competitors with much sagacity and fairness. It appears from the official acts and journals of the States General of Holland, still existing among the archives at the Hague, that on the 2d of October 1608 that body took into consideration a petition from Hans (John) Lippershey, a native of Wesell, and spectacle maker at Middleburg, praying, that an instrument which he had invented for seeing at a distance, might be rewarded, either by granting an exclusive privilege of making it for thirty years, or an annual pension to enable him to make these instruments for Holland alone. It was resolved, that a commit-

¹ *Life of Galileo*, Libr. Useful Knowledge, p. 22.

² *Dioptrics*, p. 163-4.

³ *Life of Galileo*, Libr. Useful Knowledge, p. 24.

History. tee should communicate with the petitioner, and enquire if he could not so improve the instrument *so as to enable one to look through it with both eyes*. Lippershey offered to make three telescopes of *rock crystal* for *one thousand florins* each, (about L.83 each) but the committee was instructed to get him to moderate his charge, and promise never to transmit his invention to any body. On the 6th of October a bargain was made that Lippershey should construct one instrument of rock crystal for the State, at the price of 900 florins, (L.75) 300 florins to be paid down, and 600 when the telescope was completed and approved of. On the 16th December the committee report, "that they examined the instrument invented by Lippershey to see at a distance *with two eyes*, and that they approved of it." But, in reference to the exclusive privilege, they "resolved that, whereas it appears *that many other persons have a knowledge of this new invention* to see at a distance, it is expedient to refuse the prayer of the petitioner for an exclusive privilege, but that he will be commanded to make, within a certain time, two other instruments of his invention for seeing with two eyes, at the same price." These two new instruments were delivered before the 13th February 1609.

While these transactions were going on, Jacob Adriaansz, sometimes called Metius of Alkmaer petitioned the States-General on the 17th of October 1608, for an exclusive privilege for a similar instrument. He was the third son of Adriaan Anthonisz, or Metius, who discovered the approximate ratio of the diameter of a circle to its circumference. His petition still exists among the manuscripts of Huygens, in the library at Leyden. He alleges, that he began his researches as far back as 1606; that the invention was accidental, and when he was making other experiments; and that, in 1608, when he sent in his petition, his instrument was made of bad materials. He at the same time readily admits, that a spectacle maker of Middleburg had offered before him a similar instrument to the States, which had been tried by Prince Maurice, and other persons.

Jansen.

With regard to the claims of Zacharias Jansen, or rather Tansz or Zansz, they cannot be supported by any evidence, and there is reason to believe, as we shall afterwards see, that his invention of the microscope was mistaken for the invention of the telescope.¹ The following is Professor Moll's summary of the facts which he has established by authentic documents.

"That on the 21st of October 1608, John, or Hans Lippershey, a native of Wezel, a spectacle maker of Middleburg, in Zeeland, was actually in possession of the invention of telescopes.

"That, on the 17th of October, of the same year 1608, Jacob Adriaansz, sometimes called Metius of Alkmaer in Holland, also was in possession of the art of making telescopes, and that he actually made those instruments; but that either from disgust or some other reason, he afterwards concealed his invention, and thus actually gave up every claim attached to the honour of it.

"That there is little reason to believe that either Hans, or his son Zacharias Zansz, were also inventors of the telescope; but there is every probability that this Hans, or John, or his son Zacharias Zansz, invented a compound microscope about 1590.

History. "That this Lippershey used rock or mountain crystal in the construction of telescopes, and that he is the inventor of the Binoculars."

When Galileo was at Venice in 1609, he heard rumours Galileo's that an instrument which represented distant objects as if construction of the they were near, had been invented by a Dutch spectacle telescope. maker. This rumour was confirmed by a letter which he received from James Badorere at Paris, and Galileo, who asserts that he had never seen one of the instruments, set himself to discover the principle of their construction, and to make one for his own use. It has become a question, though one of no interest, and affecting the veracity more than the reputation of Galileo, whether the Italian philosopher had actually seen one of the new instruments. We cannot hesitate for a moment in believing Galileo's assertion; and even if we confide in the statement made by Fucarius, that he had himself seen one of the Dutch telescopes, which at that time had been brought to Venice, it by no means follows that Galileo saw it.² It is quite certain, indeed, that previous to the 31st August 1609, one of the new perspective glasses had been sent from Flanders to the Cardinal Borghese,³ and Lorenzo Pignoria, on the authority of whose letter of the above date this fact rests,⁴ adds, "we have seen *some* here, and truly they succeed well."

The following is Galileo's account of the matter, from a letter which he wrote in March 1610: "It is about ten months ago that it came to our ears, that a glass had been worked by a Belgian, by the help of which, visible objects, though at a great distance from the eye of the observer, may be seen distinctly. (In the Italian of the Saggiatore it is added, *ne pia aggiunto, no more was added, or this was all*.) And some experiments were related of the admirable effects of this instrument, which some believed, and others not. A few days afterwards the same was confirmed by letters of a noble Frenchman, Jacob de Badorere, from Paris; all which occasioned me to apply myself wholly to enquire into the cause of this, and to think on the means by which the invention of a similar instrument might be brought about; in which I succeeded in a short time, assisted by the doctrine of refraction: and I first procured a leaden tube, (an organ pipe) at the end of which I adapted spectacle glasses, both plane on one side, the one convex on the other side, the second concave. Bringing the eye near the concave glass, I saw the objects large, and near enough: they appeared three times nearer, and nine times larger, than if seen with the naked eye.

"Afterwards I made another instrument, which made objects appear sixty times larger.

"Finally, sparing neither industry nor expence, I succeeded so far as to make an instrument of such excellence, as to make the objects seen through it appear a thousand times larger, and more than thirty times nearer, than if seen with the natural power of the eye."⁵

Galileo's first telescope must have been made in May or June 1610. Viviani⁶ says, that it was in April or May 1609, that the rumour of the invention of the telescope reached Venice, when Galileo was there, and that, with this information only, Galileo returned to Padua and succeeded in finding out the principle in the following night.

The new instrument long went by the names of Galileo's *tube*, the *perspective*, and the *double eye-glass*, the

¹ Professor Moll's interesting Researches on the History of the telescope, will be found in the Journal of the Royal Institution, Lond. 1831, vol. i. p. 319, 483.

² Fucarius does say that Galileo saw it. Galileo may have seen many Dutch telescopes *after* he had reinvented the instrument.

³ Ib. p. 23.

⁴ The following is the passage: "We have no news except the return of his Serene Highness, and the re-election of the lecturers, among whom Signior Galileo has contrived to get 1000 florins for life; and it is said to be on account of an eye-glass like the one which was sent from Flanders to Cardinal Borghese. We have seen some here, and truly they succeed well."

⁵ Moll, Journal of the Royal Institution, vol. i. p. 488.

⁶ Viviani vita del Galileo, p. 69.

History. more appropriate names of telescope and microscope having been afterwards given to these instruments by Demisiano.

Telescopes. Telescopes were early and eagerly imported into England, and known by the name of *trunks* and *cylinders*; and so soon as July 1609, we find that our countryman Harriot.

Harriot was directing them to the lunar disc, and had begun two full drawings of that luminary, which he afterwards completed.¹ Harriot's earliest observations on Jupiter's satellites were made on the 1st October 1610, nine months after their discovery by Galileo. The earliest telescope in England must therefore have been obtained from Holland; and in a letter from Sir William Lower to Harriot, dated *the longest day of 1610*, from Traventi in Caermarthenshire, he says, "we are here so on fire with these things, that I must render my request and your promise, to send more of all sorts of these cylinders. My man shall deliver you monie for anie charge requisite, and contente your man for his paines and skill. Send me so many as you think needful unto these observations: in requital I will send you store of observations. Send me also one of Galileus bookes, if anie yet be come over, if you can get them." In a letter dated July 6, 1610, Sir Christopher Heyden writes to his friend Camden, "I have read Galileus, and to be short, do concur with him in opinion, for his reasons are demonstrative; and of my own experience with one of our ordinary trunks, I have told eleven stars in the Pleiades, whereas no age ever remembers above seven, and one of these, as Virgil testifieth, not always to be seen."² From this and other facts, Professor Rigaud infers "that it is perfectly clear that Harriot and his friend had been in the habit of using telescopes before the discoveries of Galileo were known to them; and it appears likewise that in 1610,³ they were manufactured in England." The magnifying power of some of the telescopes used by Harriot were $\frac{6}{1}$, $\frac{10}{1}$, $\frac{11}{1}$, $\frac{15}{1}$, $\frac{20}{1}$, $\frac{30}{1}$. In a letter from Sir William Lower to Harriot, dated Traventi, 6th July 1610, he says, "I have received the perspective cylinder that you promised me, and am sorrie that my man gave you not more warning, that I might have had also the two or three more that you mentioned to chuse for me. Henceforward he shall have orders to attend you better, and to defray the charge of this an others, for he confesseth to me that he forgot to pay the worke man."

"According as you wished, I have observed the moone in all his changes. In the new I discover manifestlie the earthshine a little before the dichotomie; that spot which represents unto me the man in the moone (but without a head) is first to be seene. A little after, neare the brimme of the gibbous parts, towards the upper corner, appeare luminous parts like starres, much brighter than the rest; and the whole brimme along lookes like unto the description of coasts in the Dutch bookes of voyages. In the full she appears like a tarte that my cooke made me the last weeke. Here a vaine of bright stuffe, and there of darke, and so confusedlie al over. I must confesse I can see none of this without my cylinder; yet an ingenious younge man that accompanies me here often, and loves you and these studies much, sees manie of these things, even without the helpe of the instrument, but with it sees them most plainlie, I mean the young Mr. Protheroe."

Astronomical telescope invented by Kepler, A.D. 1611. It is highly probable that the first Dutch telescopes had their eye-glass concave, like Galileo's, though this supposition is opposed by the traditional story of a large and inverted image of a weathercock having been seen through the earliest of them, in which case the eye-glass must have been convex. Even so late as the period when Descartes published his *Dioptrics*, which was in 1637, no other telescope but a Galilean one had been described, excepting in

Kepler's *Dioptrica*, which appeared at Frankfort in 1611. History. In his 86th proposition he explains the theory of the telescope, and has shewn how an instrument which produces the same effects might be made, by substituting for the usual concave eye-glass *one or more convex* eye-glasses. Kepler, however, does not seem to have constructed such a telescope, and father Scheiner⁴ seems to have been the first person who embodied the plan in an actual instrument, which has ever since been known by the name of the *astronomical telescope*, in consequence of the inversion of the images not being disagreeable in astronomical observations.

The real inventor of the compound microscope is as little known as the inventor of the telescope. It would be in vain to inquire into the history of the single microscope, for the magnifying power of globes was known to the ancients; and no individual ambition or national partiality has endeavoured to assign the honour of inventing it to any person whatever. We agree with Professor Moll, that Zacharias Jansen, or Jansen, has the best claims to be considered as the inventor and constructor of the compound microscope. He seems to have made one so early as 1590, and to have presented one to the Archduke Albert of Austria, who gave it to Cornelius Drebell, who lived, as mathematician to the king, at the court of our James the First. William Boreel, the envoy to England from the States of Holland, saw in England, in 1619, and in the hands of Cornelius Drebell, the very microscope which Tansz had given to the archduke. This account of its history was given by Drebell himself. The microscope in question was eighteen inches long, consisting of a tube of gilt copper two inches in diameter, supported by two sculptured dolphins, resting on a base of ebony, upon which the objects were placed. M. Fontana, a Neapolitan, first described the compound microscope, consisting of two convex lenses, in his work entitled *Nova Terrestrium et Celestium Observationes*, which appeared in 1646, but claims to have made the discovery so early as 1618, though he does not adduce any evidence whatever of this fact. Huygens, on the contrary, says, "It does not appear that these microscopes were made in the year 1618, because Sirturus, who published a book that year about the origine and construction of telescopes, would hardly have been silent upon so remarkable an invention, if it had been thus known. Fontana, indeed, lays claim to it from the year 1618, in his book of *Observations*, published in 1646; but the testimony of Lyrsalis, there printed, goes no higher than the year 1625. But that my countryman Drebellius made these compound microscopes at London in the year 1621, I have often been informed by several eye-witnesses, and that he was then reckoned the first inventor of them."

This testimony of Huygens in favour of Drebell, is in direct contradiction to the statement said by Borelli to have been made to the Dutch envoy in 1619.

In consequence of this conflicting evidence, Galileo may be regarded as having the best claim to the invention of the compound microscope. Viviani distinctly informs us in his *Life of Galileo*, that he was led to the invention of the microscope by that of the telescope, and that in the year 1612, he actually sent a microscope in a present to Sigismund King of Poland. Having been dissatisfied with the performance of this instrument, he seems to have devoted himself twelve years afterwards to its improvement; and in a letter to P. Frederigo Cesi, he says that he had delayed to send him the microscope, the use of which he describes, as he had only then brought it to perfection, owing to the difficulty he experienced in making the glasses.⁵ In his *Magic of Nature*, Schottus mentions a singular accident which took place with one of the newly invented microscopes.

¹ Rigaud's *Supplement to Bradley's Miscellaneous Works*, p. 20, 21.

² Camden, *Epistolæ*, p. 129, quoted by Professor Rigaud.

³ *Life of Galileo*, Libr. Usef. Knowledge, p. 25.

⁴ Before February.

⁵ Rosa Ursina. 1650.

History. A Bavarian philosopher, when travelling in the Tyrol, was taken ill on the road and died. The village authorities found a little glass instrument in his pocket, which happened to contain a flea fixed in the focus of the microscope. Upon looking into the eye-glass, they were struck with terror at the sight of the gigantic animal, and the remains of the poor philosopher, who was then proved to be a sorcerer, were pronounced unworthy of Christian burial. Some bold sceptic, however, explored the mystery, and produced the giant which had alarmed them.¹

Discoveries of Kepler. The name of Kepler, though associated principally with astronomical discovery, will ever be venerated by the cultivators of optical science. His researches, which relate principally to vision and refraction, are contained in his *Paralipomena ad Vitellionem*, published at Frankfort in 1604, and in his *Dioptrica*, already referred to. His discoveries respecting vision, though founded to a certain degree on the views of Maurolycus and Baptista, are nevertheless to a great extent original. He was the first person who actually shewed that distinct and inverted images of external objects are formed upon the retina, as in the camera obscura, by the foci of pencils emanating from every point of the object. He explained all the phenomena of distinct and indistinct vision, and shewed how that indistinctness could be removed by the use of convex and concave glasses. Although D'Alibert² has asserted that all optical writers before him had assumed it as an axiom that every visual point is seen in the direction of its visual ray, yet, as Dr. Wells has observed, this assertion is not well founded, for Kepler had long ago maintained that objects are perceived not along the visual rays, but along lines which pass from their pictures on the retina through the centre of the eye; an opinion in which he has been followed by Dechales and Dr. Porterfield, to the last of whom Dr. Reid has by mistake ascribed the discovery of this law. Hence Kepler was led at once to the true theory of erect objects being seen from inverted images, which he considered as the business of the mind, which, when it judges of an impression made on the lower part of an inverted image on the retina, considers it as made by rays proceeding from the higher parts of an erect object, a necessary consequence of his opinion that objects are perceived in lines passing through the centre of the retina. Kepler has wisely declared his ignorance of the manner in which the mind perceives images on the retina, and he blames Vitellio for attempting the solution of a question which does not belong to optics. In order to explain the adaptation of the eye to different distances, Kepler supposed that the ciliary processes draw the sides of the eye towards the crystalline lens, by which change the globe of the eye is elongated, and the retina placed at a greater distance from the crystalline, so as to accommodate the eye to the distinct vision of near objects.

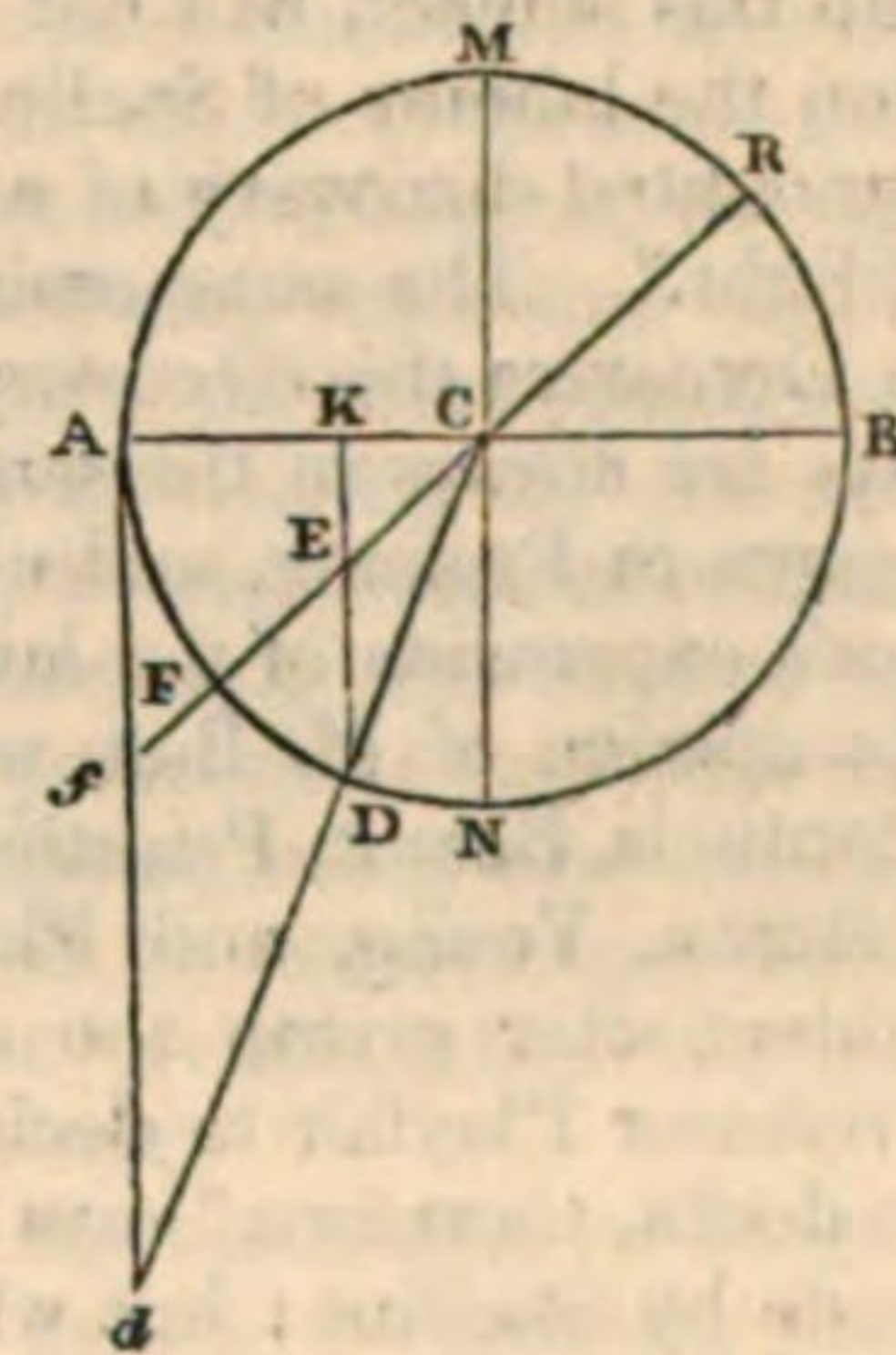
The refraction of light in its passage through different media, is treated at great length, but very unsatisfactorily, by Kepler. Although he failed in his attempts to discover the law of refraction, yet he arrived at certain rules of refraction for glass, which enabled him to discover many of the leading principles of convex and concave lenses. He found, for example, that below 30° of incidence, the angle of refraction was nearly two-thirds of the angle of incidence; that at 90° of incidence the angle of refraction was 42°; and that if the refracted ray fell at a greater obliquity than 42°, upon the interior surface of glass, it would be totally reflected back again into the glass at an angle equal to that of incidence. He then shews, by applying these principles, that plano-convex lenses of glass have their foci at a distance from the lens equal to the diameter of the sphere of which their convex surface is a portion, and that equi-convex lenses

have their focal length equal to the radius of the sphere of which their convexities are a portion. When the lens has its surface unequally convex, he makes the focal length equal to a mean of the radii of the two spheres. The same properties being proved in reference to concave lenses, Kepler proceeds to find the focus of refracted rays, when they radiate from points at different distances from the lens. He proved also that rays issuing from the focus of a lens will emerge on the other side of it parallel; that if they issue from a point between the focus of the lens, they will diverge after refraction, while those which issue from a point beyond the focus will converge; and, finally, that when the distance of the radiant point is equal to twice the focal length of the lens, the distance of the image will be equal to the distance of the object.

In treating of the refraction of the atmosphere, Kepler remarked that the quantity of refraction would alter if the atmosphere varied in weight, and that it would be different at different temperatures. In one of his letters to Bregger, dated in 1605, on the colours of the rainbow, he makes the following observation:—"The sun's rays are not coloured except with a definite quantity of refraction. Whether you are in the optical chamber, or standing opposite glass globes, or walking in the morning dew, every where it is obvious that a certain and definite angle is observed, under which, when seen in dew, in glass, in water, the sun's splendour appears coloured, and under no other angle. There is no colouring by mere reflexion, without the refraction of a clearer medium."³

Although Tycho and Kepler made many ineffectual attempts to discover the law of refraction, yet the honour of that great discovery was reserved for Willebrord Snellius, Professor of Mathematics at Leyden, who died at the age of thirty-five, leaving behind him a manuscript work on the subject. The doctrine of refraction having become more important after the invention of the telescope, Snellius devoted himself to its investigation, and "after many troublesome experiments and attempts," succeeded in his research.

Supposing AB to be the refracting surface of water, an object under the water at D appeared as if it were raised and seen in the line RC. He then produced RC till it intersected at E a line DK drawn parallel to the perpendicular MN, and he asserted that at every angle at which the object D was viewed, it would appear at E, and that CD was to CE in a given ratio, such as 4 to 3, when the refracting body was water. Now this is a true geometrical expression of the law of refraction, though the same truth may be better enunciated in other two ways. If we continue the lines CE CD, till they meet Ad, a line perpendicular to AD, in the points f and d, then on account of the parallels Ad, KD; CD is to CE as Cd is to Cf; but ACd is the complement of the angle of refraction, and ACf the complement of the angle of incidence, and Ad, Af are their secants. Hence it follows from Snellius' result, that the cosecants of the angles of incidence and refraction are in a constant ratio, which is a correct mathematical expression of the law of refraction. Again, in the triangle CDE, the sides CD CE are to one another as the Sines of the opposite angles, that is, as the Sines of the angles DEC or KEC, or ECN or RCM, and of CDE or DCN; that is the sines of the angles of incidence and refraction are



¹ *Life of Galileo*, Libr. Usef. Knowledge, p. 27.

² *Life of Kepler*, Libr. Usef. Knowledge, p. 17.

³ *Opusculæ Mathematicæ*, tom. i. p. 265.

History. *in a constant ratio*, which is the usual and most distinct expression of the law of refraction. In giving this law of Snellius, Huygens has in our opinion forgotten his usual courtesy, when he states that Willebrord Snellius did not "thoroughly comprehend his own invention," and "never imagines that the ratio was the ratio of the Sines." Now we cannot conceive it possible that a man like Snellius, who was a good geometer, was ignorant of the two simple trigonometrical expressions of his geometrical law; and we do not doubt that he preferred his own for two distinct reasons. In the first place, it connects itself with the leading physical phenomena of the apparent rise of the refracted object from D to E, and by substituting CF for CD it furnishes us with a much more simple and accurate method of obtaining by projection the refracted ray from the incident one. If RF for example, is the incident ray, we have only to divide CF into two parts, CE, EF, so that CF is to CE in the constant ratio belonging to the refracting body.

But whether we are right in this conjecture or not, it is an unquestionable truth that Snellius discovered the *true law* of refraction, though he did not express it in trigonometrical language.

Descartes. Born 1596, died 1650. In the year 1637, about eleven years after the death of Snellius, Descartes published his *Dioptrics*, in which, without ever mentioning the name, or alluding to the labours of Snellius, he announces the true law of refraction expressed in term of the Sines, as the result of his own enquiries. As Snellius's work existed only in manuscript, it was quite possible that Descartes knew nothing of its contents, but Vossius, in his work *De Natura Lucis*, states, that the heirs of Hortensius had communicated freely to Descartes the manuscripts of that professor, among which was that of Snellius's work, and Huygens confirms this allegation when he states in his *Dioptrics* that he had himself seen the whole manuscript volume of Snellius, and had heard that Descartes had also seen it,¹ and that it was perhaps from hence that he deduced (elicuerit) that measure which consists in the Sines. We should not have entered so minutely into this subject, had not M. Biot² thrown into entire oblivion the labours of Snellius, and ascribed to Descartes the undoubted discovery of what he calls "this great property of light." The same eminent philosopher likewise ascribes to Descartes the discovery that the incident and refracted rays are always in the same plane, a truth which was well known to Ptolemy, and which is clearly included in Snellius's expression of the law of refraction. In opposition to the opinion of M. Biot, we must place those of Huygens, Montucla, Bossut, Priestley, David Gregory, Smith, Hutton, Robison, Young, and Playfair; and we shall dismiss the subject after giving the admirable reasons which induced Professor Playfair to decide against Descartes. "There is no doubt, therefore," says he,³ "that the discovery was first made by Snellius; but whether Descartes derived it from him, or was himself the second discoverer, remains undecided. The question is one of those, where a man's conduct in a particular situation can only be rightly interpreted from his general character and behaviour.

"If Descartes had been uniformly fair and candid in his intercourse with others, one would have rejected with disdain a suspicion of the kind just mentioned. But the truth is, that he appears throughout a jealous and imperious man, always inclined to depress and conceal the merit of others. In speaking of the invention of the telescope, he has told minutely all that is due to accident, but has passed carefully over all that proceeded from design, and has incurred the reproach of relating the origin of that instrument without mentioning the name of Galileo. In the same manner, he omits to speak of the discoveries of Kepler, so nearly

History. connected with his own; and, in treating of the rainbow, he has made no mention of Antonio de Dominis. It is impossible that this should not produce a favourable impression; and hence it is that the warmest admirers of Descartes do not pretend that his conduct towards Snellius can be completely justified.

"Descartes would have conceived his philosophy to be disgraced if it had borrowed any general principle from experience, and he therefore derived, or affected to derive the law of refraction from reasoning or from theory."

Even if Descartes had liberally taken from his optical wreath the law of the Sines, and generously placed the hallowed branch on the brow of the accomplished Snellius, he would have added to his reputation as a man, without shortening his immortality as a philosopher. His *Dioptrics* consists of ten chapters. The first treats of light, the second of refraction, the third of the eye, the fourth on lenses in general, the fifth on the images formed on the bottom of the eye, the sixth on vision, the seventh on the mode of perfecting vision, the eighth on the figures which transparent bodies require to turn the rays by refraction, suited to all modes of vision, the ninth on microscopes, and the tenth on the mode of polishing glasses. The inability of spherical surfaces to converge rays to one point or focus, had been long known to opticians, and Kepler, though he conjectured that surfaces generated by the revolutions of the conic sections, might have such a property, left the subject just as he found it. Descartes, however, has discussed it in a most ingenious manner, in the eighth chapter of his *Dioptrics*. He has shewn how parallel, and converging, and diverging rays may be brought to accurate foci by means of ellipsoidal and hyperboloidal surfaces, so that if such surfaces, could be executed by opticians, all optical instruments would receive the highest degree of perfection which they could attain from the removal of spherical aberration. In order to carry this system into effect, he contrived machines for grinding elliptical and hyperbolical lenses, and in the tenth chapter of his *Dioptrics* he has given perspective drawings and descriptions of them. In the years 1627 and 1628, when he was residing at Paris, M. Mydorgius, with whom he lived on the most intimate habits, urged him to undertake the grinding of hyperbolical and elliptical lenses, and he soon became a great master of the art of glass grinding. He found it necessary, however, to associate with himself in this undertaking an eminent artist, M. Ferrier, who, as an optical instrument maker, was well acquainted both with the theory and the practice of his art. After many failures, a tolerably good hyperbolic convex lens was completed; but the concaves were found to be more difficult; and in consequence of M. Ferrier refusing to accompany Descartes to Franeker, and having occasioned him much needless expence in the erection of his laboratory, a quarrel took place, and the great practical object which they had in view was for a while abandoned. Descartes, however, was sanguine in his expectations, and not aware that there was another aberration more difficult to overcome than that of spherical figure, he expected to be able to make the greatest discoveries in the heavens by means of his new lenses. With the assistance of M. Huygens, the father of the celebrated philosopher, he induced some Dutch artists to renew the attempts of Ferrier; but these and his subsequent endeavours to construct such lenses have failed, though we cannot allow ourselves to think that the attempt is a hopeless one.

Descartes made some interesting observations upon vision, particularly on the method by which we judge of the distances and magnitude of objects; but his principal discovery in physical optics relates to the theory of the rain-

¹ Bossut is incorrect in saying that Huygens assures us that Descartes saw the manuscript volume of Hortensius. His words are, "*et Cartesium quoque vidisse accepimus.*" (*Dioptrica*, p. 3.)

² *Traité de Physique*, tom. iii. p. 204, 205.

³ Professor Playfair's Dissertation in this Work, vol. ii. p. 101.

History. bow. He discovered the true cause of the exterior rainbow, and in his *Traité des Meteores*, proves that it was produced by two refractions, and two intermediate reflections within the drop, thus explaining most satisfactorily the faintness of its illumination, and the inversion of its colours. He has clearly shewn also, why the interior bow is 42° in diameter, while the exterior one is 52° ; though he did not understand the true origin of the colours. We regret to add, that Descartes gives his explanations of both the interior and exterior bows without ever mentioning the name of Antonio de Dominis, who was the real discoverer of the cause of the rainbow; and our regret is increased, when we are compelled to add, that M. Biot has, contrary to the opinion of all philosophers, given his aid to Descartes in depriving the Italian philosopher of the only discovery which has immortalised his name.¹

Christo- The science of optics is under considerable obligations pher Schei- to Christopher Scheiner, a Jesuit, and professor of mathe- ner. Born matics at Ingolstadt. He completed the theory of vision in so far as he proved by direct experiment that the pictures of external objects were distinctly delineated on the retina. By paring away the coats from the back of the eyes of sheep and oxen, and also the human eye, he made the inverted pictures distinctly visible, and exhibited the experiment publicly at Rome in 1625. In his work entitled *Oculus*, published in 1652, he speaks of the great resemblance of the eye to the camera obscura, and gives various contrivances for erecting the images. He adopts the theory of Kepler respecting the visible direction of objects, and he observed the interesting fact that the pupil of the eye is dilated in viewing distant, and contracted in viewing near objects. In measuring the refractive powers of the humours of the eye, he makes that of the aqueous humour differ little from that of water, and that of the crystalline humour differ little from that of glass, ascribing to the vitreous humour an intermediate refractive power. By tracing the progress of the visual rays through all the humours of the eye, he demonstrates that the retina, and not the crystalline lens, is the seat of vision; and he describes some interesting experiments respecting vision through one or more small apertures. We owe also to Scheiner the interesting experiment of exhibiting on the wall of a darkened room the disc of the sun with all its spots by means of a telescope. When Kircher afterwards describes this appearance he represents the spectator as "fixed with the utmost astonishment."

Double re- A new and very interesting branch of optics had begun fraction of to excite the attention of philosophers, namely that of light disco- double refraction of light. Erasmus Bartholinus, a physi- covered by cian at Copenhagen, and the author of several excellent works Bartholin- on geometry, received from some Danish merchants that us, A. D. frequented Iceland, "a crystal stone like a rhombic prism, which, when broken into small pieces, kept the same figure." 1669. With this substance, which was called *Iceland spar*, from its locality, Bartholinus made a number of experiments both chemical and optical, and he has published an account of the optical results which he obtained in a small volume which appeared at Copenhagen in 1669, under the title of *Erasmi Bartholini Experimenta Crystalli Islandici, Diadastistici quibus mira et insolita Refractio detegitur*, and is dedicated to Frederick III. king of Denmark. In seventeen experiments and twelve propositions this able and sagacious philosopher has presented us with an excellent summary of the more prominent phenomena of double refraction. He has shewn that Iceland spar has the property of double refraction, that is, of giving two images of all objects seen through it, whether its faces are parallel or inclined, like those of a prism; that the incident light is equally divided

between these two pencils; that one of these refractions is performed according to the law of Snellius, the ratio of the Sines being as 1 to 1.667, but that the other is performed according to an extraordinary law which had not previously been observed by philosophers. He observed also a position in which the object appears six-fold, but he did not discover that this took place only in some specimens which were composite or irregular crystals.

These discoveries of Bartholinus having been communi- Discoveries cated to the Royal Society of London, and printed in No. of Huy- 67 of their *Transactions*, they attracted the notice of gens. Born Christian Huygens, a celebrated Dutch philosopher of the 1629, died 1695. finest genius and the highest attainments. Having given a new theory of refraction, he wanted to repeat Bartholinus's experiments principally with the view of ascertaining if they opposed any difficulties to that theory. His work on this subject, entitled *De l'estrange Refraction du Cristal d'Islande*, which forms the 5th chapter of his *Traite de la Lumière*, was written in 1678, and was read to Cassini, Roemer, and De la Hire, and to several other members of the Royal Academy of Sciences, which he had been invited to join by the liberality of the French king; but it was not published till 1690, when he was resident at the Hague. After giving Bartholinus the credit of having discovered some of the principal phenomena of double refraction, he describes the general properties of Iceland spar in forming two images of objects, and he shews that all the phenomena are related to the axis, or that diagonal of the rhomb, in the direction of which the crystal has no double refraction. He proves that the double refraction, or separation of the two images, gradually increases as the inclination of the refracted ray to the axis increases, and becomes a maximum in a plane at right angles to the axis. In the few preceding chapters of his *Traité de la Lumière* he had explained all the phenomena of reflexion and refraction upon a new theory, in which he supposes light to be produced in the same manner as sound, by means of undulations propagated in an elastic ethereal medium, an hypothesis revived by Euler and extended by Dr. Young, and now almost universally embraced under the name of the undulatory theory. In applying the same theory to explain the phenomena of double refraction, he supposes the ray produced by the ordinary refraction of the medium to be produced by spherical undulations propagated through the crystal, while the ray formed by the extraordinary refraction is produced by spheroidal undulations, the ratio of the two refractions, determining the form of the generating ellipse. Huygens then proceeds to shew that this theory affords, by calculation, results agreeing very exactly with those which he had obtained by direct experiment. This discovery is perhaps the most splendid which has occurred in the history of optical science.

When Huygens had finished his researches on double refraction, he discovered what he calls a "wonderful phenomenon,"² and, though he acknowledges that we cannot find the cause of it, yet he thinks it proper to indicate the phenomenon that others may inquire into it. This discovery is that of the polarisation of the light, which forms the two pencils of Iceland spar, and he confesses that he must add to his theory other suppositions in order to explain it, though he thinks that a theory confirmed by so many proofs will still preserve its plausibility (*vraisemblance*). Huygens had naturally supposed that the light which composed the two pencils was like all other light, but upon transmitting the two rays formed by one rhomb of calcareous spar through another rhomb, he was astonished to perceive that when the two rhombs were similarly placed as if they had formed one larger one, neither of the rays suffered double refraction in

¹ In his Optics, book ix. p. 147, Sir Isaac gives almost the whole merit of the explanation of the rainbow to De Dominis. He says, "the same explication Descartes hath pursued in his *Meteors*, and mended that of the exterior bow."

² "Une phénomène merveilleux, que j'ay decouvert après avoir écrit tout ce que dessus." (*Traité de la Lumière*, p. 88.)

History. passing through the second rhomb, the ordinary ray from the first being only ordinarily refracted by the second rhomb, and the extraordinary ray only extraordinarily refracted. The same thing took place when one of the rhombs, the second, for example, was turned round 90° , with this difference, that the ordinary ray of the first rhomb suffered only extraordinary refraction, and the extraordinary ray only ordinary refraction from the second rhomb. But in all other positions of the second rhomb, excepting these two rectangular ones, the ordinary and extraordinary rays of the first rhomb were each divided into two by the second rhomb, so that there were now *four* rays sometimes of equal but generally of unequal brightness, and such that the light of all the four never exceeded that of the single ray incident on the first rhomb.

Huygens discovered also the double refraction of quartz, or rock crystal, but he committed a great mistake in supposing that its double refraction was regulated by an entirely different law, the light being in this case *propagated through it in two spherical waves, one of which was a little slower than the other*.¹ This result he mentions in his preface as having been obtained after he had read his work to his colleagues in the Academy of Sciences. It is, however, founded on an incorrect observation, as the extraordinary refraction of rock crystal is produced by spheroidal undulations like that of Iceland spar, with this difference only, as afterwards discovered by M. Biot, that the spheroid is a prolate one.

Even if Huygens had not immortalised his name by these great discoveries, his treatises on dioptrics and on halos, and his construction of refracting telescopes of immense size, would have given him the highest reputation. His treatise on dioptrics, which was not published till 1703, among his posthumous works, and which he had begun to prepare at an early period of his life, was particularly admired by Sir Isaac Newton. It contains a copious explanation of the properties of lenses of all forms; and their spherical aberration is treated with much perspicuity, having previously, in the 6th chapter of his *Traité de la Lumière*, published an interesting discussion respecting the figures of transparent bodies for refracting and reflecting light to a single focus. The subject of vision, and the method of assisting long and short-sighted persons by lenses, is ably discussed, and nearly the latter half of the work is devoted to the theory of telescopes, telescopic eye-pieces and microscopes.

Many of these theoretical views Huygens submitted to the test of experiment. Having acquired great expertness in the art of grinding lenses, he executed refracting telescopes 12 and 24 feet in focal length, and afterwards one of 120 and another of 123 feet, with which he discovered Saturn's ring, and the fourth of his satellites. These two last object-glasses he presented to the Royal Society; but as it was impracticable to use tubes of such enormous length, Huygens contrived a method of mounting them without tubes at the top of a long pole. The practical knowledge which he had thus acquired, was published along with his Dioptrics in a work entitled, *Commentarii de formandis poliendisque vitris ad Telescopia*, a considerable part of which was published by Dr. Smith in his optics. Among his posthumous works appeared his *Dissertatio de Cornuis et Parheliis*, a work of great merit, in which he ascribes these phenomena generally to crystals of ice in the upper atmosphere, and a translation of the whole of which Dr. Smith has published in the first volume of his optics.

James Gregory. Among the eminent men who gave an impulse to optical discovery, we must assign a considerable place to our countryman James Gregory. This eminent mathematician in confirming the experiments of Vitello and Kircher on the

angles of refraction, discovered the true law which had previously been found by Snellius. He made the refractive power of water 1.3347, which coincides *exactly* with that of the middle ray between the lines D and E of Fraunhofer. Having discovered before the publication of his work that Descartes' dioptrics contained the law of refraction, he mentions the circumstance, and ascribes his being unacquainted with that work to the "want of new mathematical books," in the library of the college of Aberdeen. Although Baptista Porta appears from the extract which we have already given from his Natural Magic, to have made the nearest possible approach to the invention of the Newtonian reflecting telescope, or rather microscope, yet his experiment excited no notice, and no instrument could be said to have been invented. James Gregory, however, has described what is now known by the name of the Gregorian Reflecting Telescope, at the end of his *Optica Pranata*, published in 1663. It consisted of a parabolic concave mirror perforated at the centre, and having in front of it a small concave elliptic speculum, at a distance a little greater than the sum of their focal lengths. The parallel rays emitted by a remote object formed an image of that object in front of the great mirror, and in its focus; and in the conjugate focus of the small speculum, behind the great speculum, there was formed another image of the object, which was magnified by an eye glass. In 1664, Messrs Rives and Co. English opticians, attempted to construct a six foot Gregorian telescope, under the superintendence of its inventor, but, after a rough trial of it, Mr. Gregory, not aware of the nice adjustments which it required, conceived that the figure of the speculum was defective, and, being on the eve of going abroad, he never even made a tube for the mirrors. Stimulated by the failure of his friend, Newton, "altered," as he says, "the design of the instrument," and "placed the eye glass at the end of the tube rather than at the middle;" and, therefore, he was obliged to reflect the rays to a side by an oval plane speculum. Sir Isaac actually constructed one of these instruments with his own hands, and described it in a letter to a friend, dated the 23d February 1668-9. The aperture of the speculum was one inch, its focal length six inches, the eye glass, which was a plano-convex lens, about $\frac{2}{3}$ ths of an inch in focal length, and the magnifying power 39 times. He considered it as equal to a three or four feet refractor, and it shewed distinctly the four satellites of Jupiter, and the phases of Venus.² Encouraged by his success, he completed another telescope in 1671, which was better than the first, and which is preserved in the library of the Royal Society. The next Newtonian reflecting telescope of any importance, was executed by Mr. John Hadley in 1719 or 1720, with a speculum six inches in diameter, and five feet in focal length; but for a long time the Gregorian form was the most popular in England. About 1672 M. Cassegrain substituted a convex speculum for the small concave one of Gregory, which had the advantage of shortening the tube of the telescope without diminishing the power of the instrument.

Other claimants have arisen for the honour of inventing the reflecting telescope. Father Mersenne in a letter to Descartes in 1637, suggested the idea of using concave mirrors in reflecting telescopes; but Descartes endeavoured to convince him that his views were not likely to succeed. At a later period Fontenelle, in the *History of the Academy of Sciences*, for 1700, has very recklessly ascribed the invention of this instrument to Father Zucchi, an Italian jesuit, who published, at Lyons in 1652, a volume, entitled, *Optica Philosophica*. In this work he says, that he thought of substituting concave specula for object glasses, and having

History.

Invention of the reflecting telescope. Gregorian telescope.

Newtonian telescopes.

¹ *Traité* &c. § 20, 21. "Cette double refraction sembloit demander une double émanation d'ondes de lumière, toutes deux sphériques, (car les deux refractions sont régulières) et les unes seulement un peu plus lentes que les autres."

² Brewster's *Life of Sir Isaac Newton*, p. 26, 27.

History. found a concave metallic mirror in a cabinet of curiosities, he applied to it a concave eye glass, and observed with it celestial and terrestrial objects. As no small speculum was used in this combination, it was neither a Newtonian, Gregorian, nor Cassegrainian telescope; and if Zucchi conceived himself the inventor of a reflecting telescope, why did he conceal it till 1652, and why did he not get a real speculum made to give his idea a fair trial.

Grimaldi discovers the inflexion of light. Born 1619. Died 1663. Among the discoveries of the 17th century, that of the inflexion of light ranks among the most important. This addition to physical optics was made by Francis Maria Grimaldi, an Italian jesuit, who published an account of it in a work entitled, *Physico-mathesis de Lumine, Coloribus et Iride, aliisque annexis*, which was published at Bologna in 1665, two years after his death. Introducing a ray of the sun's light into a dark room, and through a very small aperture, he remarked, that it formed a cone of light in which all bodies had their shadows larger than if the rays passed in straight lines by their edges. Round these shadows he noticed three coloured fringes becoming narrower as they were farther from the body, and in strong light he observed similar coloured fringes, varying from two to four, according to the distance of the shadow from the body. Hence our author concluded that light is bent from its rectilinear path in passing by the edges of bodies.

When he admitted the light through two small apertures, so near each other that the one luminous cone did not penetrate the other till at a considerable distance from the apertures, he observed that the rays so interfered with one another, as to render the spot illuminated by their *united light more obscure than when it was illuminated by either of them singly*. This extraordinary result is announced in the following proposition: "That a body actually illuminated, may become more obscure by adding a new light to that which it already receives," and may be regarded as the first discovery of the interference of light.

Dr. Hooke. Born 1635. Died 1703. Dr. Robert Hooke, one of the most ingenious and able men of the century which he adorned, not knowing of the discovery of Grimaldi, communicated to the Royal Society in 1672, an account of "the discovery of a new property of light not mentioned by any optical writers before him." In a subsequent communication in 1675, he draws the following conclusions from his experiments:—1. There is a *deflection* of light, differing both from reflexion and refraction, and seeming to depend on the unequal density of the constituent parts of the ray, whereby the light is dispersed from the place of condensation, and rarified, or gradually diverged into a quadrant. 2. This deflection is made towards the superficies of the opaque body perpendicularly. 3. Those parts of the diverged radiations, which are deflected by the greatest angle from the straight or direct radiation, are the faintest, and those that are deflected by the least angles are the strongest. 4. Rays cutting each other in one common foramen, do not make the angles at the vertex equal. 5. Colours may be made without refraction. 6. The diameter of the sun cannot be taken with common sights. 7. The same rays of light, falling upon the same point of an object, will turn into all sorts of colours by the various inclination of the object. 8. Colours begin to appear when two pulses of light are blended so well, and so near together, that the sense takes them for one."

We owe, also, to Dr. Hooke the first accurate experiments that were made on the subject of thin plates, which, we believe, had been first observed by Mr. Boyle.¹ He investigated the leading phenomena as exhibited in the colours of the soap bubble, and between two plates of glass pressed together. He discovered that the colours depended upon certain thicknesses of the thin plates, but he failed in determining the relation between given thicknesses and given

colours. He succeeded in splitting mica into plates of extreme tenuity, as to give the most brilliant colours, one giving a *yellow*, another a *blue*, and the two together a *deep purple*. In his *Micrographia*, printed about seven years before any of Newton's experiments were made on the same subject, Dr. Hooke has published the following remarkable explanation of these phenomena, which coincides in a singular manner, with that which is now universally received: "It is most evident, says he, that the reflection from the under or further side of the body, is the principal cause of the production of these colours. Let the ray fall obliquely on the thin plate, part thereof is reflected back by the first superficies,—part refracted to the second surface, whence it is reflected and refracted again. So that, after two refractions and one reflection, there is propagated a kind of fainter ray, and by reason of the time spent in passing and repassing, this fainter pulse comes behind the former reflected pulse; so that hereby, (the surfaces being so near together that the eye cannot discriminate them from one) this confused or duplicated pulse, whose strongest part precedes, and whose weakest follows, does produce on the retina the sensation of a yellow. If these surfaces are further removed asunder, the weaker pulse may become coincident with the reflection of the second, or next following pulse, from the first surface, and lag behind that also, and be coincident with the third, fourth, fifth, sixth, seventh, or eighth; so that, if there be a thin transparent body, that from the greatest thinness requisite to produce colours, does by degrees grow to the greatest thickness,—the colours shall be so often repeated, as the weaker pulse does lose paces with its primary or first pulse, and is coincident with a subsequent pulse. And this, as it is coincident, or follows from the first hypothesis I took of colours, so upon experiment have I found it in multitudes of instances that seem to prove it."

Galileo, and the philosophers of the Accademia del Cimento, had proposed to measure the velocity of light by means of a base on the surface of the globe; but such an attempt was utterly hopeless, and it was only in a wider range that this problem could be solved. Baffled in finding an explanation of some irregularity in the emersion of the first satellite of Jupiter, Cassini and Roemer had concluded that it depended on the distance of Jupiter from the earth, and that in order to explain it it was necessary to suppose, that the light of the satellite required ten or eleven minutes to move across the earth's orbit. This happy idea seems to have first occurred to Cassini, but he speedily abandoned it, while Roemer pertinaciously cherished the hypothesis, and at last immortalised himself by demonstrating in the most rigorous manner that light moves through the diameter of the earth's orbit, a distance of 190 millions of miles, in eleven minutes.

Passing over the valuable researches of Tschirnhausen, a Saxon nobleman, on caustic curves, which had been previously discovered, and the discoveries of Mariotte and de la Hire, respecting the seat of vision, which have not terminated in any satisfactory conclusions, we are brought to one of the most brilliant periods of optical discovery.

In the year 1665, Sir Isaac Newton, when only 23 years of age, bought three prisms, but he does not seem to have made any particular experiments with them. In 1666, however, he bought another, with which he proposed to repeat Grimaldi's experiment, on the elongation of the sun's image produced by the prism. In the course of this and the two or three subsequent years, he made and perfected his great discovery of the *different refrangibility of light*, which he communicated to the Royal Society on the 6th of February 1672, having, on the 18th of January, announced it as "the oddest if not the most considerable detection

History.

Roemer. Born 1644. Died 1710.

Discoveries of Newton. Born 1642. Died 1727.

¹ *Experiments and Observations upon Colours*, 1663.

History. which hath hitherto been made in the operations of nature." Having found that refraction could not be produced without colour, he was led to direct his attention to the perfection of the reflecting telescope, and produced the instruments which we have already mentioned. Another result of this discovery was the completion of the theory of the rainbow, the origin of the colours of which had hitherto perplexed philosophers.

The next optical discovery made by Sir Isaac Newton, related to the *colours of thin plates*, or of thin transparent bodies, such as the soap bubble. We have already seen that Dr. Hooke had made some progress, both in observing the phenomena and in investigating the cause of such colours; but it is to Newton that we owe an elaborate analysis of the subject. In a letter from Sir Isaac to Dr. Hooke, dated 5th February 1676, he acknowledges that the latter had previously observed "the dilatation of the coloured rays by the obliquation of the eye, and the opposition of a black spot at the contact of two convex glasses, and at the top of a water bubble," (soap bubble). In the course of his experiments on thin plates, Newton was led to the discovery of the colours of thick plates, and he devised a theory for explaining both classes of phenomena, known by the name of the theory of fits of easy reflexion and transmission. This theory, remarkable for its ingenuity, is now no longer an expression of the phenomena, and has given way to the theory of undulations, which Hooke had the sagacity to anticipate as affording the true cause of the colours of thin plates.

Early in 1676, Newton communicated to the Royal Society his *Theory of the Colours of Natural Bodies*, in which he ascribes all the varieties of colour exhibited in nature to the circumstance "that the transparent parts of bodies, according to their several sizes, reflect rays of one colour and transmit those of another, on the same grounds that thin plates or bubbles do reflect or transmit those rays." This theory, perhaps the finest of all Newton's optical speculations, has met with much opposition. It was controverted by Mr. Delaval, Sir John Herschel, and others, in its leading propositions; but some recent discoveries afford us reason for believing that the principal objections to it are groundless, and that with some modifications it may yet be placed among the finest generalizations in science.

Sir Isaac Newton's experiments on the inflexion of light were never finished by their author. His observations were limited, and his theory incorrect; and indeed it was only from the hands of those who adopted the undulating system that a true explanation of the phenomena could be expected.

The experiments of our author on the refractive powers of bodies, from which he anticipated that the diamond "was probably an unctuous substance coagulated," have on this account been regarded with high favour, while his few observations on the double refraction and polarisation of light have almost disappeared from the history of optics.¹

Achromatic telescope.

The next great step in the history of optical discovery is the invention of the *achromatic telescope*, or telescopes which are free from colour. When Sir Isaac Newton found that he could not produce refraction without colour, he abandoned the improvement of the refracting telescope as hopeless, and devoted himself to the construction of reflectors.

History. The opinion at which he had arrived respecting the impracticability of refracting light without colouring it, was, however, an erroneous one, which he had deduced from an incorrect observation of the relative length of the prismatic spectra formed by different bodies, when the mean refraction was the same. In less than two years after Newton's death, namely, in 1729, Mr. Chester More Hall, of More Hall in Essex, was led by the study of the human eye, which he erroneously conceived to be achromatic, to consider the possibility of constructing a telescope by an analogous combination of media. After many experiments, he found two kinds of glass capable of producing, by their combination, refraction without colour.² About 1733 he completed several such object-glasses, which, with a focal length of twenty inches, bore an aperture of more than two-and-a-half inches, one of which was long afterwards in the possession of the Rev. Mr. Smith of Charlotte Street, Rathbone Place, and was found to be achromatic. Another of Mr. Hall's telescopes was in the possession of Mr. Ayscough, optician in Ludgate Hill, in 1754. Mr. Hall, however, kept his invention a secret; none of his instruments were either sold or exhibited for sale, and those into whose hands they fell do not seem to have discovered either their principle or their value.

Without calling in question the merits of Mr. Hall, we must do justice to those of Mr. John Dollond, an undoubted inventor of the achromatic telescope, who, unacquainted with the instruments of Mr. Hall, proceeded step by step, in a scientific progression, till he invented and constructed the achromatic telescope in 1757. To this eminent individual, and the other members of his family, we owe the construction of many of the finest instruments by which the science of astronomy has been so much promoted. Mr. Peter Dollond, the son of John Dollond, first suggested and used the triple object-glass, in which a better correction of the spherical aberration was effected, by placing the concave flint glass between two convex lenses of crown glass.

The mathematical world owe many obligations to Euler, Clairaut, D'Alembert, and Boscovich, for their able investigations of the theory of achromatism, but their investigations did not prove of any practical value; and it has been justly stated by Sir John Herschel, "that from all the abstruse researches of Clairaut, Euler, and D'Alembert, and other celebrated geometers, nothing hitherto has resulted beyond a mass of complicated formulas, which, though confessedly exact in theory, have never yet been made the basis of construction for a single good instrument, and remains therefore totally inapplicable, or at least unapplied in practice."³

No attempt had hitherto been made to measure the intensity of different lights emanating either directly from luminous bodies, or when transmitted through or reflected from different bodies. This subject, to which the name of Photometry has been given, was begun by Huygens and P. F. Marie, who describes an instrument called a *lucimeter*; but it is to M. Bouguer and M. Lambert that we owe the most scientific and complete investigation of this class of facts.

Bouguer's earliest experiments were published in 1729, in his *Optical Essay on the Gradation of Light*, which was republished in 1760, much augmented and improved, under the title of *Traité d'Optique sur la Gradation de la Lumière*.

Bouguer.
Born 1698.
Died 1758.

¹ We must refer our readers for a full and elaborate account of Newton's optical discoveries to a new work, entitled *Memoirs of the Life, Writings, and Discoveries of Sir Isaac Newton*, in which Sir David Brewster is now occupied, having had access to the interesting collection of the papers of Sir Isaac, in the possession of the Earl of Portsmouth.

² Mr. Hall might have got this hint from David Gregory's *Catoptrics*, published at Edinburgh in 1713. "But if," says he, "on account of physical difficulties in grinding and polishing proper specula, we should still use lenses, it would perhaps be useful to employ media of different density to compose the object-glass, as we see done by nature in the structure of the eye, where the crystalline humour, (of almost the same refractive power as glass), is joined by nature, who does nothing in vain, with the aqueous and vitreous humours, (not unlike water in their refractive power), to paint the image as distinctly as possible in the bottom of the eye." Gregory's *Catoptrics*, prop. xxiv. SCHOLIUM. Dr. Brown's translation of the preceding passage is very incorrect.

³ *Phil. Trans.* 1821, p. 222.

History. Bouguer was followed in this inquiry by M. Lambert, an able German mathematician, who published an account of his researches at Augsburg in 1760, in a duodecimo volume of 547 pages, entitled *Photometria seu de Mensura et Gradibus Luminis, colorum et umbræ*. It is divided into seven parts: 1. On the modifications and degrees of direct light, and of its brightness and illuminating power; 2. Experiments and calculations on the modifications of light depending on transparent bodies, but chiefly glass; 3. Experiments and calculations respecting the modifications of light depending on the opacity of bodies; 4. Calculations and experiments on the sense of light, and its apparent brightness; 5. On the dispersion of light passing through diaphanous media, chiefly the earth's atmosphere; 6. Calculations respecting the illumination of the planetary system; and, 7. On the modifications and degrees of heterogenous and relative light, or the light of colours and shadow.

Lambert. Born 1728. Died 1777.

Passing over the minor labours of Porterfield, Turner, Mazeas, Dutour, Buffon, Scheiffer, Darwin, Melville, Mitchell, and others we come to the period of Sir William Herschel. Since the discovery of the belts and nearest satellites of Saturn, no discovery of any importance had been made respecting the natural history of the heavens. At the age of 36, when Sir William was residing at Bath, he devoted much of his time to the construction of telescopes; and the following account of his progress is too interesting to be given in any other language than his own,—“When I resided,” says he, “at Bath, I had long been acquainted with the theory of optics and mechanism, and wanted only that experience which is so necessary in the practical part of these sciences. This I acquired by degrees at that place, where, in my leisure hours, by way of amusement, I made for myself several two feet, five feet, seven feet, ten feet, and twenty feet Newtonian telescopes, besides others of the Gregorian form, of eight inches, twelve inches, two feet, three feet, five feet, and ten feet, focal length. My way of doing these instruments at that time, when the direct method of giving the figure of any one of the conic sections to specula was still unknown to me, was to have many mirrors of each sort cast, and to finish them all as well as I could, then to select by trial the best of them, which I preserved; the rest were put by to be re-polished. In this manner, I made no less than two hundred seven-feet, one hundred and fifty ten-feet, and about eighty twenty-feet, not to mention those of the Gregorian form, or of the construction of Dr. Smith's reflecting microscope, of which I also made a great number. My mechanical amusements went hand in hand with the optical ones. The number of stands I invented for these telescopes it would not be easy to assign. I contrived and delineated them of different forms, and executed the most promising of the designs. To these labours we owe my seven-feet Newtonian telescope stand, which was brought to its present convenient construction about 1778.”

By means of these instruments, with which he surveyed the heavens with unwearied diligence, he discovered the Georgium Sidus, with six satellites, two new satellites circulating round Saturn, the quintuple belt and double ring of the same planet, and various other astronomical phenomena of the highest interest. In 1783 he finished a twenty-feet reflector, with an aperture of $18\frac{7}{16}$ inches, and formed the design of constructing a still larger instrument. On the recommendation of Sir Joseph Banks, his Majesty George III. agreed to defray the expense of a large telescope, and under his munificent patronage, which has never since been imitated by his successors, Sir William began in 1785, and completed on the 27th August 1789, a reflecting telescope forty feet in focal length, having its great speculum *four feet* in breadth three-and-a-half inches thick, and weighing, when newly cast, 2118 pounds. On the 28th of August, the day after this gigantic instrument was erected, Sir William discovered a new satellite of Saturn, and in the same year another sa-

History. tellite, both of which were nearer the body of the planet than the other five discovered by Huygens and Cassini. In this manner the telescope, which was a toy in the hands of Galileo, became with Sir William Herschel a vast machine, carrying the observer himself, and directed and moved by appropriate mechanism.

An improvement in the achromatic telescope, of great value, though not yet brought into practical use, was made by Dr. Robert Blair. Although in the achromatic telescope composed of crown and flint glass, the colour was as completely corrected as it was possible to do with such lenses, yet it had long been observed that there were residual colours, which formed what are called a secondary spectrum, and which arise from the coloured spaces in the spectrum, produced by crown glass not having the same size as those in a spectrum of equal length produced by flint glass. Various attempts had been made in vain to obtain other substances, in which this *irrationality*, as it was called, of the coloured spaces did not exist; and Dr. Blair was hence led to attempt the removal of the secondary spectrum by other means. The plan which he adopted was the following. He made each lens of his compound object-glass achromatic, but in such a way that the secondary spectrum produced by the one should be corrected by the secondary spectrum produced by the other. Such an object-glass required two fluid media and three lenses of glass, and Dr. Blair succeeded in constructing them so as to be perfectly free from all secondary colour. In the course of his experiments, however, he was fortunate enough to discover that the muriatic acid mixed in proper proportions with metallic antimony, or butter of antimony, as it was called, gave a spectrum, in which the colours had exactly the same proportion as crown glass; and hence, by enclosing this fluid between two lenses of crown glass, the one next the object being plano-convex and the other a meniscus, he obtained an object-glass in which the rays of different colours were bent from their rectilinear course with the same equality and regularity as in reflexions. To such an object-glass he proposed to give the name of *aplanatic*, to indicate the entire removal of all aberration. Dr. Robison informs us that one of these telescopes, which did not exceed *fifteen inches* in length, equalled in all respects, if it did not surpass, the best of Dollond's achromatic telescopes *forty-two inches* long. After the death of Dr. Blair, his son, Mr. Archibald Blair, attempted in vain to produce instruments of the same perfection. Had this young man lived, he might have executed something better, but he was cut off at an early age, and has left to the Royal Society of Edinburgh an account of his father's methods, which we hope may prove useful to science.

Hitherto the undulatory theory of light as proposed by Dr. Th. Huygens and supported by Hooke and Euler, had met with few adherents; and the reputation of Newton had given to the theory of emission an adventitious authority to which it was not entitled. Dr. Young, however, boldly threw down the gauntlet and maintained the theory of Huygens with the greatest ingenuity and talent. In his paper of 1800, entitled *Outlines of Experiments and Observations on Sound and Light*, he shews that light has a strong analogy with sound, and that it is produced by the undulation of a highly elastic ethereal medium which pervades all nature. In another paper, which he published in 1801, *On the Theory of Light and Colours*, he applies the theory of undulations to the explanation of natural phenomena; and lays down the following hypotheses: 1. That a luminiferous ether pervades the universe, rare and elastic in a high degree. 2. That undulations are excited in this ether whenever a body becomes luminous. 3. That the sensation of different colours depends on the different frequency of vibrations excited by light in the retina; and, 4th, that all material bodies are to be considered, with respect to the phenomena of light, as consisting of particles so remote from each other as to allow the

History. Dr. Blair.
A.D. 1787.
Died 1829.

Dr. Th. Young.
Born 1773.
Died 1829.

Sir William Herschel.
Born 1738.
Died 1822.

History.

etherial medium to pervade them with perfect freedom, and either to retain it in a state of greater density and of equal elasticity, or to constitute together with the medium an aggregate which may be considered as denser but not more elastic. He then proceeds to demonstrate in nine propositions, some of the leading truths in the theory, applying them in corollaries to the colour of striated surfaces, the colours of thin plates, the colours of thick plates, and the colours produced by inflexion. In 1802, Dr. Young published *An account of some causes of the Production of Colours not hitherto observed*. The cases described in this paper are the colours of delicate fibres and of mixed plates. The first he explains by the interference of two portions of light, one reflected from the fibre and the other bending round its opposite side, and at last coinciding nearly in direction with the former portion. The colours of mixed plates are those produced when moisture, butter, or tallow, are placed between two plates of glass, so that portions of air are intermixed with these substances. A candle seen through such a medium is surrounded with a sort of halo, and Dr. Young considers the colours as produced by the light which passes through one of the media, moving with greater velocity so as to anticipate the light which comes more slowly through the other.

In 1803, Dr. Young published what may be considered as his principal paper, entitled *Experiments and Calculations relating to Physical Optics*, in which he has given an experimental demonstration of the general law of interference. By intercepting the rays which passed on one side of a body which formed fringes by reflexion, the fringes disappeared whether the interception was made on one side or the other of the body. This admirable experiment established the truth of his law of interference, and paved the way for those splendid generalizations respecting the undulatory theory which have so widely enlarged the boundaries of optics.

In April 1814, in a review of Malus, Biot, and Brewster's *Experiments on Light*, which he contributed to the *Quarterly Review*, he first published his explanation of the colours of crystallised plates produced by polarised light by the law of interference, an explanation which is now universally admitted. In the article on *Chromatics*, which Dr. Young contributed to this work, the reader will find a full account of the discoveries to which the law of interference has been so successfully applied. One of the most important applications of the undulatory theory was published in that article for the first time. Dr. Young has there given an expression of the velocity of reflected light at a perpendicular incidence from bodies of various refractive powers, which is a simple function of the index of refraction.

In giving an account of Sir William Herschel's discoveries, we have not mentioned his discovery of invisible heating rays beyond the red extremity of the spectrum, because we have ourselves succeeded in discovering the luminous rays at that part of the spectrum. In repeating Sir W. Herschel's experiments, M. Ritter of Jena placed muriate of silver in different parts of the spectrum, and found that it soon became black *beyond* the violet extremity, less black in the violet rays, becoming still less black in the blue and green, and so on till the blackness vanished. When he used muriate of silver, slightly blackened or disoxygenated, its white or original colour was partly retained by the red, and still more by the supposed invisible rays beyond it. In these experiments of Ritter's, as well as in those of Sir W. Herschel, the solar spectrum, when seen by the eye, as thrown upon paper, is extremely short. A great part of the violet extremity as well as the red extremity is invisible, so that when the thermometer and the muriate of silver seemed to be wholly out of the spectrum, they were completely within the violet and the red spaces, as we have placed beyond a doubt by

Ritter,

A.D. 1801.

comparing the length of a spectrum on paper with that which can be rendered visible by directly looking through a telescope at a highly magnified one.

Without knowing of the experiments of Ritter, Dr. Wollaston discovered the chemical effects which exist at the violet end of the spectrum; but the merit of this experiment decidedly belongs to Scheele, who discovered that muriate of silver was more blackened in the violet rays than in any other part of the spectrum. The principal discovery in optics, which we owe to Dr. Wollaston is his method of observing the spectrum, and his discovery of *five* fixed lines in it. The following is his own description of it: "I cannot conclude these observations on dispersion without remarking that the colours into which a beam of white light is separable by refraction, appear to me to be neither seven, as they usually are seen in the rainbow, nor reducible by any means (that I can find) to three, as some persons have conceived; but that, by employing a very narrow pencil of light, four primary divisions of the prismatic spectrum may be seen with a degree of distinctness that, I believe, has not been described nor observed before."

"If a beam of day-light be admitted into a dark room by a crevice $\frac{1}{8}$ of an inch broad, and received by the eye at a distance of ten or twelve feet, through a prism of flint glass *free from veins*, held near the eye, the beam is seen to be separated into the four following colours only, red, yellowish green, blue, and violet; in the proportion represented in the figure.

"The line A that bounds the red side of the spectrum is somewhat confused, which seems, in part owing to the want of power in the eye to converge red light. The line B, between red and green, in a certain position of the prism, is perfectly distinct; so also are D and E, the two limits of violet. But C, the limit of green and blue, is not so clearly marked as the red; and there are also, on each side of this limit, other distinct dark lines, *f* and *g*, either of which in an imperfect experiment, might be mistaken for the boundary of these colours.

"The position of the prism in which the colours are most clearly divided is when the incident light makes about equal angles with two of its sides. I thus found that the spaces AB, BC, CD, DE, occupied by them, were nearly as the numbers 16, 23, 36, 25.

"Since the proportions of these colours to each other have been supposed by Dr. Blair to vary according to the medium by which they are produced. I have compared with this appearance the coloured images caused by prismatic vessels, containing substances supposed by him to differ most in this respect, such as strong but colourless nitric acid, rectified oil of turpentine, very pale oil of sassafras, and Canada balsam also nearly colourless. With each of these I have found the same arrangement of the four colours, and, in similar positions of the prisms, as nearly as I could judge, the same proportions of them.¹

"But, when the inclination of any prism is altered so as to increase the dispersion of the colours, the proportions of them to each other are thus also changed, so that the spaces AC and CE, instead of being as before 39 and 61, may be found altered as far as 42 and 58." These interesting observations are appended to his *Method of examining Refractive and Dispersive Powers by Prismatic Reflection*, which was published in the *Phil. Trans.* for 1802.

In the year 1800, Dr. Wollaston published in the *Philosophical Transactions* some interesting experiments and observations *On Double Images caused by Atmospheric Refraction*, and in the same work for 1802, he communicated a series of measures *On the Oblique Refraction of Iceland Crystal* in different planes, which he found, as the measures taken by Huygens had done before,

History.

Dr. Wollaston.

Born 1766,

Died 1828.

¹ The observations in this paragraph are quite incorrect. Dr. Blair's results to which they stand opposed have been placed beyond the reach of doubt.

History. to agree in a remarkable manner with the beautiful law established by the Dutch philosopher.

Malus. Born 1775. Died 1812. These researches of Dr. Wollaston, but particularly the discoveries of Dr. Young, had about this time drawn the attention of the philosophers of France to the subject of double refraction. Laplace had considered the deviation of the extraordinary ray, as due to the action of the attractive and repulsive forces by which Newton and his successors had endeavoured to explain the ordinary refraction and reflexion of light; and the Institute of France were thus led in 1808 to propose the double refraction of light as the subject of a prize to be adjudged in 1810. Among the few memoirs which were sent in competition for this prize, that of E. L. Malus, colonel of the imperial corps of engineers was the successful one. After his return from the fatal expedition to Egypt he had composed his *Traité d'Optique*, a work of great merit; but as soon as the subject of double refraction was announced, he devoted himself to the inquiry with equal ardour and success. Residing in the Rue des Enfers, in Paris, he happened to view, through a doubly refracting prism, the windows of the palace of the Luxembourg, which were then reflecting to his eye the rays of the setting sun, and, on happening to turn round the prism, he was surprised to perceive that one of the two images of each window vanished in every quadrant of the rotation of the prism. In pursuing this remarkable experiment he was conducted to the splendid discovery which forms an epoch in the history of optics, *that when a pencil of light is reflected by a surface of glass at an angle of $54^{\circ} 35'$, or of water at an angle of $52^{\circ} 45'$, the reflected light possesses all the characters of one of the pencils formed by double refraction.* Hence the pencil was said to be *polarised* by reflexion. When a pencil thus reflected was made to fall on another surface of the same kind at the same angle, but so that the plane of the second reflexion was at right angles to the plane of the first, then not a single ray of the light suffered reflexion, the whole pencil suffering refraction only. When the light fell upon a plate of glass the light reflected from the second surface acquired the same property.

On the 11th of March 1811, Malus announced to the Institute, that, when a pencil of light was thus polarised by reflexion, the light which was at the same time transmitted through the surface consisted of a portion of light polarised in an opposite direction, and proportional to that which was reflected, and of another portion not modified, which preserves the properties of direct light. This last portion becomes less and less by transmitting the ray through a number of plates in succession till the transmitted pencil is wholly polarised in one direction.

Malus likewise made several experiments on the polarisation of light by metals, and he was led to the conclusion, that the difference between transparent and metallic bodies was, that the former refract all the light polarised in one direction, and reflect all that is polarised in the other, while metallic bodies reflect what they polarise in both directions.

In a series of experiments on crystals and organised substances, communicated to the Institute on the 19th August 1811, Malus found that they all *depolarised* a pencil of polarised light; that is, a pencil of polarised light which refused to be reflected by another surface properly placed, recovered its power of being reflected after being transmitted through crystals and organised substances. All crystals which did not crystallise in the form of the cube or the regular octohedron were found to possess the property of depolarisation; and the organised substances which he found to possess the same property, were the transparent and fibrous portions of leaves and flowers, the pellicles which cover the hazel, silken and woollen fibres, white hairs, scales, horn, ivory, feathers, the skins of quadrupeds

and fishes, shells, and the whiskers of a whale. Malus intended to prosecute this subject to a greater extent, but his brilliant career of discovery terminated by his death on the 7th February 1812.

History. Discoveries of M. Arago. Born 1786. The loss of Malus, great as it was felt to be, was immediately supplied by his distinguished colleague in the Institute, M. Arago, who has added to this and other departments of science so many brilliant discoveries. On the 11th of August 1811, before the death of Malus, M. Arago communicated to the Institute a memoir "On a particular modification which the luminous rays experience in their passage through certain transparent bodies."¹ Upon exposing thin plates of sulphate of lime, mica, and rock-crystal, to polarised light, and subsequently analyzing the light which they transmitted by a prism of calcareous spar, M. Arago observed the most splendid complementary colours changing with every variation in the inclination of the plate. When the light was incident perpendicularly, and the plate turned round in its own plane, the colours were in all positions the same, though they varied in intensity. He found two positions at right angles to each other, in which the crystal gave no colour, and these positions were those in which the principal section of the crystal was perpendicular to, or coincident with the plane of primitive polarisation. Setting out from these positions, the intensity of the ray gradually increased, and became a maximum at an angle of 45° to that plane. When the crystallised plate was fixed, and the analysing plate turned round so as to vary the inclination of the plane of reflexion from it, to that of the fixed plate which polarised the light primitively, the change in the colours was most beautiful. M. Arago observed that the colour reflected in any one position of the analysing plate was *complementary* to the colour reflected in the perpendicular position. He also found that the power of depolarising the different colours diminished with the thickness of the plate, and he reduced mica to such a degree of thinness that it depolarised no colours at all. In studying the same phenomena in sulphate of lime and rock crystal, M. Arago was led to the conclusion that the colours depended on some other cause than that of the thinness of the plate. M. Arago likewise discovered the depolarising property in a piece of flint glass, about three quarters of an inch in thickness.

We owe also to M. Arago the discovery of circular polarisation in quartz, which he made in 1811. By transmitting polarised light along the axis of the prism he observed the tints to be different in their nature from the ordinary tints of the mineral, although they increased and diminished with the thickness of the plate. When analysed with a prism of Iceland spar, he observed that the true images had complementary colours as in the ordinary tints, and that the colours changed, descending in Newton's scale as the prism was turned round, so that if the colour of the extraordinary image was *red*, it became in succession *orange yellow*, *green*, and *violet*; and hence he drew the important inference that the differently coloured rays had been polarised in different planes in passing along the axis of the crystal. M. Arago's duties in the Observatory prevented him from pursuing these valuable discoveries with that continuity of labour which they demanded.

A very important discovery was made by M. Arago respecting the colours of thin plates.² When the rings of thin plates were examined through a rhomb of Iceland spar, M. Arago discovered that when the principal section of the rhomb was parallel and perpendicular to the plane of incidence, the intensity of the light in one of the images varied with the incidence, and that this image vanished altogether when the pencil of light was inclined 35° to the surface, or when it was incident at the maximum polarising angle. This result was the same, whether he examined the reflect-

¹ Mémoires de l'Institut 1811, part i. p. 93-134.

² Mémoires d'Arcueil, tom. iii. Sur les Couleurs des Lames Minces.

History. ed or the transmitted rings. Hence he inferred that the light of both the systems of rings was polarised in the plane of incidence, at the polarising angle for glass. M. Arago has likewise shewn that the colours of the reflected and transmitted rays are complementary, and that their intensities are exactly equal, completely neutralising each other or forming white light when they are superposed. The most interesting experiment, however, made by M. Arago, is that in which he examined the rings when a convex lens was pressed upon a metallic reflector. When viewed with a prism of Iceland spar, as before, one of the two images vanished at the maximum polarising angle of the glass, but the phenomena were different above and below this angle. At less angles, the dimensions and the colours of the rings were the same in both images, which differed only in the quantity of their light; but at greater angles, the rings in the two images had their colours complementary, the one beginning from a white centre, and the other from a black one.

We have already seen that Dr. Young first applied the principle of interference to explain the colours of crystal-lised plates; but he did not explain why these colours are not produced excepting with polarised light. MM. Arago and Fresnel entered upon this inquiry, and obtained a satisfactory solution of the difficulty. They found that two rays of light polarised in the same plane, produced fringes by their interference as in common light; that no interference at all takes place when these planes are at right angles to each other: and that at an intermediate inclination, the interference is diminished, and the fringes decrease in intensity. In following out these interesting results, they found that two oppositely polarised pencils will not interfere even when their planes are made to coincide, unless they belong to a pencil which had been wholly polarised in one plane.

We owe also to M. Arago the beautiful discovery that the quantity of polarised light in the reflected and transmitted pencils of common plates are exactly equal.

We are indebted likewise to M. Arago for some important results respecting the interference of light. We have already seen that the interior fringes formed by diffraction disappear when the light which passes by one side of the inflecting body is stopped. M. Arago observed that these fringes were displaced by making the same light pass through a thin plate of some transparent substance, and that the bands were always shifted to the side on which the plate was placed. The amount of this displacement determines the velocity of light in the interposed medium, and consequently gives us a measure of the refractive power of that body with the highest degree of accuracy.

In conjunction with M. Biot, M. Arago published a valuable series of experiments on the density and refractive power of *nine* gaseous bodies measured in relation to atmospheric air taken as unity. Hydrogen stood at the head of the table, with a refractive index equal to 6.61436, (or 7.0335 if we use the density given by Berzelius) whilst oxygen stood at the foot of the table with a refractive index of 0.8616.

M. Biot. Born 1774. Among the most successful cultivators of physical optics, M. Biot holds a distinguished place. His attention was first directed to the colours of crystalline plates discovered by M. Arago, and by nice instruments and indefatigable labour he determined the general laws of the phenomenon in reference to the thickness of the plates, and the composition of the tints as observed in sulphate of lime and rock crystal, calcareous spar, and arragonite. He observed that at a perpendicular incidence the two colours correspond to those seen by reflexion and transmission in thin plates of air, and he concluded that the thicknesses at which these colours were developed, were proportional to the thickness

History. of the plate of air which gave the same tint in Newton's scale. These thicknesses were found to vary with the nature of the crystal, and were always much greater than the thicknesses of thin plates which gave the same tints. He had at first supposed that at oblique incidences the changes of colour followed the same law as in thin plates, but he afterwards found that the tint depended on the thickness of the crystal traversed by the refracted ray, and as the square of the sine of the angle which the direction of the ray formed with the optic axis. In these experiments M. Biot considered arragonite, sulphate of lime, topaz, and mica, as all having one axis of double refraction like calcareous spar.

In order to explain these various phenomena, M. Biot communicated to the Institute in 1812¹ his ingenious theory of *Moveable Polarisation*. In this theory the particles of a polarised ray are supposed to preserve their primitive polarisation till they reach a certain depth in the crystal, when a succession of isochronous oscillations round their centre of gravity take place, the axes of polarisation being carried alternately to each side of the axis of the crystal. The depth through which the particle is carried during each of these oscillations, is assumed to be twice the depth through which it has passed before the oscillations began. When the ray emerges from the crystalline plate, the oscillations are supposed to stop, and the ray assumes a *fixed polarisation*, (in which the axes of the particles are arranged in two rectangular directions) as if the last oscillation had been completed when it quitted the plate.

The remarkable colours discovered by M. Arago along the axis of quartz, were carefully studied by M. Biot, and he and M. Seebeck, nearly about the same time discovered the existence of the very same colours in several essential oils and solutions, such as oil of turpentine, oil of laurel, oil of lemons, syrup of sugar, the two first turning the planes of polarisation from right to left, and the two last from left to right. In a memoir laid before the Institute in 1818, he has shewn that the angular rotation of the plane of polarisation is directly proportional to the thickness of the plate and inversely to the square of the length of the fits as given by Newton. He then concludes that this property of turning the particles of light round their centres of gravity resides in the ultimate particles of solid or fluid bodies, that it is necessary to their very existence, and that it is entirely independent of their mutual distances and mode of aggregation.

M. Biot afterwards resumed this subject, and extended his researches to a great variety of substances; and he has still more recently employed circular polarisation in detecting the constituents of particular vegetable substances, where chemical analysis had partly or wholly failed. He has shewn that the soluble portion of plants, or the farinaceous matter of grain and roots, to which he has given the name of *dextrine*, and which M. Raspail had considered to be of the nature of gum, turns the planes of polarisation more powerfully to the *right* (hence the name *dextrine*) than the syrups of *cane sugar*; and that all the *gums*, and the syrups of the *sugar of grapes*, turn the planes of polarisation to the left. M. Biot has also applied the same method of research in ascertaining the changes which take place in the sap of trees, and in analysing the processes of vegetation which are concerned in the growth of wheat and rye. His researches are of great practical value in an agricultural point of view, and ought to impress on those whom it most concerns, the important truth, that the most recondite discoveries in science will sooner or later find an useful application.

One of the most important discoveries made by M. Biot was the true nature of the double refraction and polarisation in quartz, which Huygens had been unable to develope. M.

¹ Sur un nouveau genre d'Oscillation que les Molecules de la Lumière éprouvent en traversant certains cristaux.

History. Biot found that it differed from that of calcareous spar, in having the phenomena regulated by a *prolate* in place of an *oblate* spheroid, the least refracted image being the ordinary ray in quartz, and the extraordinary one in Iceland spar.

Sir David Brewster. Whilst these valuable researches were carrying on in France, Sir David Brewster was occupied with the same subject in Scotland. In his *Treatise on New Philosophical Instruments*, published in the beginning of 1813, he has shewn that chromate of lead and realgar exceed the diamond¹ in refractive power; that diamond, phosphorus, and sulphur have their high refractive powers in the order of their inflammabilities; that fluor spar and cryolite have their refractive powers below all solid substances, (excepting *tabasheer*), and lower dispersive powers than all other bodies; and that all doubly refracting crystals have a double dispersive power. He shewed that oil of cassia had the least, and sulphuric acid the greatest action upon green light; that a tertiary spectrum is formed, when prisms of the same substance but different angles are made to correct the dispersion, by the inclination of one of them; and that achromatic combinations may be effected by prisms and lenses of the same kind of glass.

In the year 1812, he began to study the subject of the polarisation of light, in consequence of having become acquainted with Malus's celebrated discovery of the polarisation of light by reflexion. He discovered the remarkable property of the agate, by which it gives only a single distinct image polarised in one plane; the property of depolarisation possessed by almost all minerals, and by many animal and vegetable substances;² the polarised colours produced by thin plates of mica and topaz; the partial polarisation of light by polished metals;³ and the complete polarisation of the exterior and interior rainbows.

In the course of these inquiries our author discovered the two beautiful systems of elliptical coloured rings, which we see by transmitting polarised light along the two optical axes of topaz; and in consequence of his using a conical in place of a parallel beam of light in these experiments, he was led to observe the same system of rings, under different modifications, in various other bodies. While examining the depolarising effect of a plate of mica at an oblique incidence, he was led to the discovery of the polarisation of light by oblique transmission through bundles of crystallised or uncrystallised plates; and though Malus had anticipated him in this discovery, yet he had determined the law of the phenomena, which had escaped the notice of that skilful observer.

Hitherto no idea had been formed of the mechanical condition of bodies in which the polarising and doubly refracting structure were exhibited; but in the years 1814 and 1815, a new light was thrown upon the subject, by three discoveries made by Sir David Brewster, namely, that the polarising structure could be produced in glass by heat, and also by rapid cooling;⁴ that Prince Rupert's glass drops, formed by rapid cooling, possessed that structure;⁵ and that *by means of simple pressure, that species of crystallisation could be communicated to soft and indurated jellies, which forms two apparently polarised images, and exhibits the complementary colours by polarised light.*⁶

We have already seen that Malus considered the property of polarisation by reflexion as independent of the other modes of action which bodies exercise upon light. In order to investigate this subject, Sir David Brewster made an ex-

History. tensive series of experiments to determine the angles of maximum polarisation by reflexion, from the surfaces of bodies, and from the separating surfaces of different media. After encountering many difficulties, he was led to the discovery of the very simple law *that the index of refraction is the tangent of the angle of polarisation*, which is rigorously true for all separating surfaces, and for rays of all refrangibilities; and hence we obtain an immediate explanation of the perplexing fact, that at the maximum polarising angle the polarisation of the ray is never complete. When this law is expressed geometrically, it informs us that when a ray of light is polarised by reflexion, the reflected ray forms a right angle with the refracted ray; that the sum of the angles of reflexion and refraction is a right angle, or counting from the surface, that the angles of reflexion and refraction are equal. In the same paper, our author has shewn that light may be completely polarised by two, three, or more reflexions, at angles all above or all below, or partly above and partly below the angle of complete polarisation, a greater number of reflexions being required, as the incident ray approaches either to the refracting surface, or to a line perpendicular to it. In the same paper, it is shewn that every ray of light polarised by reflexion has been acted upon by the refracting force; and that total reflexion exercises an analogous action upon light with metallic surfaces.

The influence of heat in producing a transient polarising structure in glass, led our author to an elaborate examination of the subject in 1815.⁷ When the edge of a thick plate of glass is laid on a bar of hot iron, the heat gradually propagates itself along the plate, and its path is marked by the most beautiful fringes of polarised light; but no sooner has the heat entered the plate of glass, than similar fringes appear on its upper edge, *where there is no heat at all*. After a certain period, the whole surface of the glass is covered with coloured fringes, which are arranged in two similar polarising structures at the edges, separated by two dark lines or axes from an opposite structure in the middle. When the glass is removed from the iron, the fringes gradually disappear, and are extinguished when the heat is uniformly diffused over the glass. If the plate of glass is made very hot in boiling oil, and is then allowed to cool with its edges against a plate of cold iron, it will exhibit in a fainter degree the fringes above described; but they are now all reversed, the middle structure having the same character as the external structures had formerly, and *vice versa*. If, when a plate of glass is covered over with the polarised tints, it is suddenly cut in two by a diamond in the direction of its length, the whole structure is instantly changed, and each piece has the same properties and structure as the whole, exactly like a portion detached from the end of a magnet. The same properties he found in muriate of soda, fluor spar, obsidian, semi-opal, horn, tortoise-shell, and various animal and vegetable bodies. The tints thus developed by heat exhibit, by their being made to cross one another and by other modifications, a series of the most brilliant phenomena within the whole range of optics.

In continuing these experiments, our author found that when the plate of glass, after being brought to a red heat, was allowed to cool quickly, it exhibited permanently the same coloured fringes, a discovery which had likewise been made by Dr. Seebeck of Nuremberg.

This paper is followed by another, published in the same

¹ In all tables of refractive powers of solids and fluids, *diamond* stood at the head, and *water* and *ice* at the bottom. Our author, however, placed various substances above *diamond*, and *tabasheer* far below *ice*.

² *Phil. Trans.* 1815, p. 27.

³ These discoveries were communicated to the Royal Society of Edinburgh, and owing to the state of communication between France and England, neither the author nor any of the members of the Society were acquainted with the previous discovery of M. Arago of the colours of crystalline plates, or with those of Malus on depolarisation and metallic polarisation.

⁴ *Phil. Trans.* 1814, p. 1.

⁵ *Id. Id.*

⁶ *Id.* 1815, p. 60.

⁷ *Phil. Trans.* 1816, p. 46, and *Edinburgh Transactions*, vol. viii. p. 383, where the phenomena are represented by formulæ.

History. volume of the *Transactions*,¹ on the communication of the structure of doubly refracting crystals, to glass, muriate of soda, fluor spar, and other substances, by mechanical compression and dilatation; and on the 17th November 1816, our author communicated to the Royal Society of Edinburgh another paper, on the effects of compression and dilatation in altering the polarising structure of doubly refracting crystals.²

In 1816 he communicated to the Royal Society his experiments on mother-of-pearl, explaining the origin of its fine superficial colours, and shewing that they could be communicated to wax, isinglass, the fusible metals, and even to lead, by hard pressure. In 1815 he published a paper on the multiplication of images, and the colours which accompany them, in some specimens of calcareous spar,³ a subject which had exercised the sagacity of Huygens, Benjamin Martin, Brougham, Robison, and Malus. The last of these philosophers ascribed the multiplication of the images to the interception of the pencils by fissures within the crystal, and the colours to the thin plate of air which it enclosed; but Sir David Brewster discovered the true cause of the phenomena, and proved that there were no fissures nor plates of air; that the multiplication of the images arise from one or more veins of calcareous spar, which divided the rhomb into prisms, so as to form composite crystals, having the axes of crystallization and of double refraction of the two contiguous crystals turned round 180°, so that each of the two pencils formed by double refraction are subdivided in passing from the one crystal to the other. He has shewn also that the colours are the polarised tints produced by thin plates crystallized, these plates giving the regular system of coloured rings seen along the axis of calcareous spar, the light being polarised by the first prism of spar, and analysed by the last. Hence it follows that the polarised tints of crystals were seen and studied by Huygens and his successors, without having any idea of what they were.

The crystalline lenses of animals had hitherto been supposed to increase regularly in density, from the circumference to the centre, for the purpose of correcting the spherical aberration. Sir David Brewster, however, shewed, in 1816,⁴ that there were often three structures in such lenses, a structure increasing in density from the centre, being accompanied with another diminishing in density, and that these structures displayed themselves in circular rings of polarised tints, traversed by a rectangular black cross, the tints themselves sometimes rising to a bright yellow of the first order. About the same time he discovered the remarkable property of the diamond, of exhibiting irregular patches of doubly refracting structures, as if it had been in the state of gum, subject to irregular pressure, or induration;⁵ and having afterwards discovered gaseous cavities in the same gum, in which the expansive pressure of the included gas had communicated to the surrounding parts a regular doubly refracting structure, he corroborated his supposition that it had a vegetable origin,⁶ which he has more recently confirmed by discovering that many diamonds consist of strata of different refractive powers, a property not possessed by any mineral body.⁷

In the beginning of February 1815, when examining the action of metals upon polarised light, our author discovered that complementary colours were produced by one or more reflexions from plates of gold, silver, and other metals; that analogous colours were produced by total reflexion; that common light was wholly polarised in the plane of incidence by a number of metallic reflexions, this number being greater in silver and gold than in the other metals. Though ex-

History. amined with much care both by our author and M. Biot,⁸ the nature and law of these phenomena were still veiled in obscurity.

Hitherto all crystals were believed to have one axis of double refraction, like Iceland spar or quartz; but in the year 1817,⁹ Sir David Brewster discovered that the greater number of crystals, and among these arragonite, sulphate of iron, sulphate of barytes, sulphate of strontian, topaz, felspar, and nitre, had two axes of double refraction, which he called resultant axes, and which were more or less inclined to each other, as the intensity of the real axes more or less approached to equality. By measuring the deviation of the two pencils in different planes, he found that the double refraction was the same in every part of the same ring, disappearing along the resultant axis, and increasing with the value of the tints; and by projecting the coloured rings, and measuring the angular distances from the axis at which the same tints were produced, he was led to the true physical law of the tints, and of the deviation of the extraordinary ray. This general law, when applied to the polarised tints, is thus expressed: *The tint produced at any point of the sphere, by the joint action of two axes, is equal to the diagonal of a parallelogram whose sides represent the tints produced by each axis separately, and whose angle is double of the angle formed by two planes passing through that point of the sphere and the respective axis.* When the law is applied to the phenomena of double refraction, it may be thus expressed: *The increment of the square of the velocity of the extraordinary ray produced by the action of two axes of double refraction, is equal to the diagonal of a parallelogram whose sides are the increments of the square of the velocity produced by each axis separately, and calculated by the law of Huygens, and whose angle is double of the angle formed by two planes passing through the ray and the respective axis.* When the two rectangular axes are of equal intensity and of the same character, the preceding law gives the very same results as the law of Huygens does for one axis placed at right angles with the other two. When the crystal has three equal rectangular axes, their forces are in equilibrio in every part of the sphere, and there is neither double refraction nor polarisation. When the first of these laws is applied to the mysterious actions of sulphate of lime, with the origin and classification of which M. Biot had been so much perplexed, and which he has represented by complicated and empirical formulæ, the whole mystery disappears, and all the diversified and capricious variations of tint which he had ascribed to secondary forces, become the legitimate and calculable results of two axes of double refraction.

During these laborious researches, our author was led to the law by which the primitive forms of minerals are connected with the number of their axes of double refraction, and to point out the connexion between the optical structure and chemical composition of crystals.

The absorption of common light, in virtue of which crystals exhibit different colours, or shades of colour, in different directions, had been long observed by Wollaston, Cordier, Bournon, De Drée, and others; but Sir David Brewster discovered that in a great number of coloured crystals, both with one and two axes of double refraction, polarised light was absorbed, according to regular laws depending on the inclination of the ray to the axis or axes of the crystal, and that in such crystals the two pencils are always differently coloured, the difference of colour disappearing in the direction of the axis, and rising to a maximum at right angles to it. These phenomena are finely seen in super-acetate of

¹ *Edinburgh Transactions*, vol. viii. p. 156.

² *Id.* vol. viii. p. 281.

³ *Phil. Trans.* 1815, p. 270, and *Edinburgh Transactions*, vol. viii. p. 165.

⁴ *Phil. Trans.* 1816, p. 311.

⁵ *Edin. Trans.* 1816, vol. viii. p. 167.

⁶ *Geological Trans.* 1816.

⁷ See our art. MICROSCOPE, vol. xv. p. 30.

⁸ *Traité de Physique*, tom. iv. p. 579.

⁹ *Phil. Trans.* 1818, p. 199.

History. copper, dichroite, Brazilian topaz, and augite. These properties are shewn by our author to be singularly modified by heat, and even communicated to crystals which do not naturally possess it. Absorbing crystals have been called *dichroitic*, and the property itself *dichroism*.

The subject of circular polarisation was likewise examined by our author in quartz and amethyst.¹ He found that heat entirely removed from quartz the power of producing circular polarisation, when the substance was reduced to fusion; he discovered it near the resultant axis of chrysoberyl, and in certain specimens of unannealed glass.² In examining the proportions of the amethyst, he found that this interesting mineral combines the opposite structures of the two kinds of quartz, being composed of alternate strata of right and left-handed quartz, these two opposite actions destroying each other at their junction, where the colouring matter of the amethyst is principally apparent.

In all the experiments on the polarisation of light by reflexion from crystallised surfaces, their action was supposed to be the same as that of common solids and fluids, and Malus had distinctly stated it as the result of experiment, that Iceland spar had the same polarising angle on all its surfaces and in every azimuth, its action being "independent of the position of the principal sections," "that its reflecting power extends beyond the limit of the polarising forces of the crystal, and that as light is only polarised by penetrating the surface, the force which produces extraordinary refraction begins to act only at this limit."³ Doubting the accuracy of these results, Sir David Brewster instituted a series of experiments *on the action of crystallised surfaces upon light*, by which he has established the remarkable fact that the angle of complete polarisation varies from $57^{\circ} 14'$ to $59^{\circ} 32'$, on the surface of the rhomb of calcareous spar, being a minimum in the plane of the principal section, and a maximum in a plane perpendicular to it. But it is not merely the polarising angle that is changed. When the ordinary reflecting force is weakened by causing the reflexion to be made from the refracting surface of oil of cassia and Iceland spar, he found that the light was no longer polarised in the plane of reflexion, and that the deviation from this plane depended on the inclination of the ray to the axis of the crystal, the deviation becoming less and less as the refractive power of the fluid was diminished. In the same paper he has shewn that by altering the mechanical condition of the surfaces of crystals, and making the ray enter this surface from fluids of different refractive powers, the ordinary or the extraordinary image may be weakened or extinguished at pleasure.⁴

In the year 1816, Sir David Brewster discovered a remarkable system of coloured rings in apophyllite, a singularly constituted crystal, one part of which has one axis, whilst another part has two axes of double refraction. Different parts of this crystal possess different degrees of double refraction, with the same thickness, and at the same inclination to the axis; and the beautiful and symmetrical figure which a perfect crystal exhibits by polarised light, delineated in the most splendid colours, is perhaps the finest sight which the mineral kingdom can present to us.⁵ By the aid of polarised light, our author discovered also a singular structure in certain crystals of chabasie, in which the double refraction gradually diminishes in successive strata, then vanishes, and reappears with an opposite sign, the one double refraction being positive and the other negative; but the most remarkable of all these structures was that of *analcime*,

History. in which he discovered a new species of double refraction, in which the phenomena are related to planes in place of axes, in which the double refraction disappears.⁶

In the year 1829, our author communicated to the Royal Society of London six papers. The first of these was *on the reflection and decomposition of light at the separating surfaces of media of the same and of different refractive powers*.⁷ The second, entitled, *on periodical colours produced by the grooved surfaces of metallic and transparent bodies*,⁸ contains an account of a new series of periodical colours exhibited by grooved surfaces, which succeed each other in a plane at right angles to that in which the usual spectra are seen, and producing a singular modification of these spectra; phenomena not yet brought within the pale of the undulatory theory. In the third paper, *on the double refraction produced by pressure in the molecules of bodies*,⁹ he has shewn that the axis of pressure is a regular axis of double refraction, and that the doubly refracting properties, which are not inherent in the molecules themselves, are produced by the pressure caused by the forces of aggregation, which generally differ in intensity in the direction of the three rectangular axes. The same author has more recently succeeded in producing regular double refraction by the expansive presence of heat. The other three papers treat of the laws of the polarisation of light by reflexion¹⁰ and refraction,¹¹ and on the action of the second surfaces of transparent plates¹² upon light. In these papers he has given formulæ for computing the quantities of light polarised at all incidences, both by reflexion and transmission; and has explained all the phenomena of partial polarisation, and those produced by any number of successive reflexions and transmissions. In the last of these three papers our author shews that the quantity of polarised light in the light reflected and transmitted by a transparent plate is not equal at all angles of incidence, and that the proposition is true when applied to surfaces alone, the apparent equality in the first case being produced by unexcluded light polarised perpendicular to the plane of reflexion.

We have already seen that Malus, Biot, and Sir David Brewster had been baffled in their attempts to unravel the complex phenomena of metallic polarisation. The last of these authors had at various times resumed the investigation; but it was not till February 1830, that he communicated the result to the Royal Society, in a paper entitled, *on the phenomena and laws of elliptic polarisation, as exhibited in the action of metals upon light*.¹³ All the phenomena of metallic polarisation are shewn to be those of elliptical polarisation, connecting the phenomena of circularly polarised light with those of plane polarised light, the action of *silver* approaching nearest to that of totally reflecting surfaces by which circular polarisation is produced, and that of *galena* to transparent bodies or those not metallic, by which plane polarisation is produced. The colours accompanying these phenomena have no relation to those of crystallised plates, and in the case of silver and gold are extremely beautiful and splendid.

Hitherto the analysis of solar light by Sir Isaac Newton had been regarded as complete, and incapable of any farther development. From this analysis he himself deduced the conclusion, *that to the same degree of refrangibility ever belonged the same colour*, and to the same colour ever belonged the same degree of refrangibility. So early as 1822, in a paper, on the *monochromatic lamp*, &c.,¹⁴ Sir David Brewster shewed that some of the colours of the spectrum

¹ *Edin. Trans.* vol. ix. p. 139.

² *Treatise on Optics*, Lardner's Cabinet Cyclopædia, p. 128.

³ *Théorie de la Double Refraction*, p. 240.

⁴ *Phil. Trans.* 1819, p. 145.

⁵ *Edin. Phil. Journal*, vol. i. p. 1, and *Edin. Trans.* vol. ix. p. 317.

⁶ *Id.* vol. x. p. 187.

⁷ *Phil. Trans.* 1829, p. 187, or *Edin. Jour. of Science*, N.S., vol. i. p. 204.

VOL. XVI.

⁸ *Id.* p. 301, or *Edin. Jour. of Science*, vol. ii. p. 46.

⁹ *Id.* 1830, p. 87, or *Edin. Jour. of Science*, vol. iii. p. 28.

¹⁰ *Id.* 1830, p. 69, or *Edin. Jour. of Science*, N.S., vol. iii. p. 160.

¹¹ *Id.* *Id.* p. 135, or *Id.* *Id.* p. 218.

¹² *Id.* *Id.* p. 145, or *Id.* *Id.* p. 230.

¹³ *Id.* *Id.* p. 287, or *Id.* *Id.* No. 5, vol. iv. p. 136, 247.

¹⁴ *Edin. Trans.* vol. ix. p. 433.

History. were compound, capable of being analysed by absorbing media, and that *different colours had the same refrangibility*. This result stood in direct opposition to the Newtonian doctrine, and our author, in order to support it, undertook an elaborate series of experiments the results of which were communicated to the Royal Society of Edinburgh in 1831, in a paper entitled, *on a new analysis of solar light, indicating three primary colours forming coincident spectra of equal lengths*.¹ In these three overlapping spectra the intensity of each colour is a maximum at that point where the same colour is most intense in the compound spectrum. Hence it follows that all the colours in the solar spectrum are compound, consisting of red, yellow, and blue light in different proportions, so that if at any point we separate as many rays of each colour as is necessary to produce *white light*, by absorbing the excess at that point, we should exhibit the strange phenomenon of *white light incapable of being decomposed by the prism*. This has actually been done by Sir David Brewster, by means of absorbing media. But in a very recent communication made to the Royal Society, (in June 1837), he has explained a new method of effecting this by perfectly transparent media, which he calls *analysis by dissection*, and of which we shall give some account in another part of this article. This paper was followed, in 1833, by another, *on the colours of natural bodies*,² in which our author shews that they have not the same composition as those of thin plates, and demonstrates the truth of this opinion by a special analysis of the green colour of plants, the most prevalent tint in nature, and the one which Newton had pronounced to be of the third order. In the same year our author published his *Observations on the Lines of the Solar Spectrum, and on those produced by the earth's atmosphere, and by the action of nitrous acid gas*,³ but we must reserve our notice of this paper till we come to describe the discoveries of Fraunhofer.

Dr. Seebeck. The late Dr. Thomas John Seebeck of Nuremberg, was an active and successful cultivator of the science of Optics. Born 1770. His first experiments on this subject were published in Schweigger's Journal for April 1813 and December 1814. Died 1831. In 1811 M. Arago observed the polarising structure in thick pieces of flint, and in 1812 Sir David Brewster had noticed the same property in some pieces of plate glass.⁴ In Dr. Seebeck's paper of 1813, he observed the regular figure produced by polarised light, when the glass had the regular form of cubes and cylinders. In cubes of an inch in diameter, he found them to be indistinct, and not produced by fluor spar or rock salt. In his second paper of December 1814, he shews that a plate of glass made red hot, and set upon its edges to cool, exhibits at the part which cools first a series of coloured fringes, which spread over the whole plate, the structure which produces them remaining permanently fixed in the glass. These experiments are posterior to those made in Scotland on the effects of heat upon glass, and on the polarising structure of glass cooled in water.

Early in 1816, Dr. Seebeck discovered the property of certain essential oils in producing the polarised tints, the property of single refraction possessed by tourmaline, and the system of coloured rings produced by Iceland spar; but in these discoveries he was anticipated, as we have seen, by others, though he is entitled to all the merit of a second discoverer.

In 1809 Dr. Seebeck communicated to the Academy of Sciences at Berlin, an interesting memoir *on the unequal production of heat in the prismatic spectrum*,⁵ in which he shewed that the place of maximum heat varied with the substance of which the prism was made, being in the *yellow rays* in the spectra formed by water, (and according to Wunsch, in

alcohol and oil of turpentine); in the *orange* in concentrated sulphuric acid, and solution of sal ammoniac and corrosive sublimate; in the *middle of the red* in crown and plate glass, and *beyond the red* in flint glass. Dr. Turner⁶ ascribed these results to the different powers of these media to refract the rays of solar heat; but Sir David Brewster explained them by supposing that colourless transparent bodies exercise the same variety of absorptive action upon heat that coloured bodies do upon light, the body in the last case becoming coloured in consequence of that action. Hence the maximum ordinate of heat will shift its position with the nature of the body, and we shall no doubt find media, several maxima and minima, and points of no heat at all, according as we increase the size of the prism or the thickness which the heat traverses.⁷ The best way to carry such researches is to use a prism of glass whose curve of heat is well ascertained, and then to determine the changes which take place in the curve by interposing thick plates of transparent solids and fluids.

This eminent philosopher would have done still more for the science of optics, had he not been attracted to the study of thermo-electricity, in the creation and extension of which he has immortalised his name.

We are indebted to Dr. A. Seebeck for a series of instructive Dr. A. and accurate experiments on the polarising angle of different Seebeck. substances, which confirm the accuracy of the law of the tangents,⁸ and another on the polarising angle of calcareous spar in different azimuths.

We come now to that auspicious period in the history of Fresnel. optics, when this science was destined to receive the grand- Born 1788. est accessions from the genius of M. A. Fresnel, engineer Died 1827. of roads and bridges. What Newton did for astronomy, Fresnel did for physical optics; and all Europe will, we are persuaded, confirm the decision which places him pre-eminently above all the other cultivators of this branch of science. The discoveries of Fresnel, however, are so connected with theoretical considerations, that it is impossible, in a historical sketch, to give any thing like an idea of their magnitude and importance. The phenomena of rotatory polarisation in quartz, which had so much perplexed philosophers, have been completely explained by Fresnel. He found that they arise from the interference of two circularly polarised pencils, propagated with different velocities along the axis of quartz, the one revolving from right to left, and the other from left to right, and that a plane polarised ray is equivalent to two circularly polarised rays of half the intensity. These facts he verified experimentally, by an achromatic combination of right and left-handed prisms of quartz, so disposed as to double the refraction of the images.

M. Fresnel had also found that light was circularly polarised by two total reflexions from glass at an angle of about $54^{\circ} 37'$, and by placing between two rhombs of glass, each of which polarised the light circularly and had their planes of reflexion at right angles to each other, a crystalised plate, he observed the light transmitted through this system exhibited phenomena analogous to those seen along the axis of rock crystal. The rhomb of glass so cut, that when the incident rays enter and leave it perpendicularly, they have suffered two reflexions at an angle of $54^{\circ} 37'$, is well known by the name of Fresnel's rhomb.

Fresnel's theory of double refraction and polarisation, one of the finest efforts of genius, conducted its author to many important results which had escaped the notice of the most diligent observers. Hitherto it had been taken for granted by all, and appeared to be proved by Biot's experiments on topaz, that in biaxal crystals one of the rays

¹ *Edin. Trans.* vol. xii. p. 123, or *Edin. Journal of Science*, new series, vol. v. p. 197.

² *Id. Id.*

³ *Id. Id.*

⁴ *Treatise on New Phil. Insts.* p. 335.

⁵ *Berlin Memoirs*, 1818-1819, p. 305, or *Edin. Jour. of Science*, vol. i. p. 358, No. 2, Oct. 1824.

⁶ *Chemistry*, 3d edit. p. 84.

⁷ *Second Report of the British Association*, 1832, p. 294.

⁸ *Edin. Jour. of Science*, N. S. vol. v. p. 99.

History. followed the ordinary law of the sines; but it followed from Fresnel's theory that it did not, and by a series of the nicest and most difficult experiments he determined, that neither of the two rays have a constant velocity, both being performed according to a new law. What had been called the extraordinary ray, he found by his theory to be regulated by the law discovered by Sir David Brewster, and simplified in its mathematical expression by M. Biot, and he shewed that all the phenomena of double refraction could be accurately calculated. The axes of elasticity in Fresnel's theory are the same as the axes of double refraction in Sir David Brewster's, and the laws of the composition and resolution of such axes in uniaxal, biaxal, and tessular crystals, which have no double refraction previously given by the latter, are all necessary results of the same theory.

But the most remarkable part of Fresnel's theory is his explanation of the polarisation of light. The hypothesis of *transversal vibrations* first presented itself to Dr. Young while considering the law of extraordinary refraction in biaxal crystals, as communicated to him by Sir David Brewster. M. Fresnel, however, shewed that it was a necessary consequence of the laws of interference, and that the vibrations of a polarised ray are on the surface of the wave, and perpendicular to the plane of polarisation. In unpolarised light they are also only on the surface of the wave, and this species of light is conceived to "consist of a rapid succession of systems of waves polarised in every possible plane, passing through the normal to the front of the wave." Hence light is polarised by resolving the vibrations into two sets in two rectangular directions.¹

We have already slightly noticed the fine discoveries of MM. Arago and Fresnel on the interference of polarised light, and we can now only refer with admiration to the beautiful series of experiments by which the phenomena of moveable polarisation were properly explained, and brought under the dominion of the undulatory theory. When a polarised ray proceeding from a luminous point was transmitted through two rhomboids of Iceland spar of equal thickness, whose principal sections were inclined 45° to the plane of primitive polarisation, the emergent light will diverge as if from two near points, and the two portions will be oppositely polarised. MM. Arago and Fresnel found that the light formed by the union of these pencils was *plane, circularly, or elliptically* polarised, according to the difference of the paths traversed when they met. Following out this principle, MM. Arago and Fresnel were led to an *experimentum crucis*, to determine the accuracy of the theory of moveable polarisation. A homogeneous ray of polarised light was transmitted through a plate of sulphate of lime, having its principal section inclined 45° to the plane of primitive polarisation, and of such a thickness that it should be circularly polarised according to the undulatory theory, and plane polarised according to the other; and the result was decisive against the theory of moveable polarisation.

We owe also to M. Fresnel the true theory of the inflexion or diffraction of light. The Institute of France made this the subject of their physical prize for 1818, and the memoir of our author was the successful one. He had at first adopted and extended the theory of Dr. Young, that the fringes arise from the interference of the direct and inflected light; but he was afterwards obliged to admit, that rays passing at a sensible distance from the reflecting body, deviate from their primitive direction, and interfere with the direct light. This interesting effect he ascribes to a number of elementary waves sent from each portion of the

surface of the principal wave when it reaches the reflecting body, and he determines the resultant of all the elementary waves sent by these portions to a given point. Upon applying this theory to various cases of inflexion, he found it to agree so well with observation, that, with the exception of the case of diffraction by narrow apertures, the theory did not err more than the 2500th part of an inch.

Among the many important discoveries of Fresnel we must enumerate the theory of the reflexion of light. Dr. Young had shewn on the undulatory theory, that at a perpendicular incidence the intensity of the reflected light was a very simple function of the index of refraction.² M. Poisson had arrived by another process at the same result, without knowing, we believe, what had been done by Dr. Young;³ and he afterwards extended his inquiries to different incidences.⁴ The conclusions, however, at which this distinguished mathematician arrived, were inconsistent with observation; and Fresnel had the good fortune to give a complete solution of the problem, by combining the doctrine of transversal vibrations with the theory of waves. He assumes, that the elasticity of the ether in the two media are equal, but their density different, though he also solved the problem on the more general assumption, that the elasticity was different in the two media. He thus obtained formulæ for all incidences and all refractive powers, and the law of the tangents, as well as that of the equality of pencils, polarised by reflexion and transmission, became the consequences of these formulæ. At a perpendicular incidence the formula coincides with that of Young and Poisson, and at 90° the whole light is reflected, a result which has been verified by observation.⁵

Contemporary with the discoveries of Fresnel were those of the late M. Fraunhofer of Munich, who made several important observations on the solar spectrum, on the diffraction of light, on refractive and dispersive powers, and on the refrangibility of the light of the fixed stars. By using fine prisms entirely free of veins, he discovered that the solar spectrum was crossed by about 590 black lines, and he executed a beautiful drawing of the spectrum, in which the most important of these are projected. Fraunhofer was not aware that Dr. Wollaston had previously discovered *seven* of these lines; but this slight anticipation does not in the least degree diminish the singularity of this splendid discovery. He discovered similar lines in electric light, and in the spectra of the Moon, Venus, Mars, Castor, Pollux, Sirius, Capella, Betelgeus, and Procyon;⁶ but none whatever in artificial white flames. These lines he found to have a fixed position in relation to the coloured spaces, and, by measuring accurately the distance of prominent lines in the different coloured spaces, he obtained measures of the refractive and dispersive powers of bodies with a degree of accuracy hitherto unknown. Fraunhofer considered these lines as having their origin in the nature of the sun's light; but Sir David Brewster, who by particular methods has discovered more than twice the number of lines reckoned by Fraunhofer, has established the curious fact, that many of them are produced also by the action of the earth's atmosphere. In his researches on this subject Sir David Brewster discovered the remarkable property possessed by nitrous gas of producing analogous lines in great numbers, increasing in width with the thickness of the gas, or with an augmentation of its temperature. "The power of heat alone," says this author, "to render a gas, which is almost colourless, as red as blood, without decomposing it, is in itself a most singular result; and my surprise was greatly

History.

¹ See *Bulletin de la Soc. Philomathique*, 1824, and *Mém. de l'Institut*, tom. xvii.

² See the article CHROMATICS, written by Dr. Young, vol. vi. p. 650.

³ *Id.* tom. x.

⁴ *Edin. Journal of Science*, No. xv. p. 7. Sir David Brewster asserts, that all the coloured stars derive their colours from defective lines in their spectra, having found these lines in those most strongly coloured.

⁵ *Mém. de l'Inst.* tom. ii.

⁶ See *Ann. de Chim.*, 1821.

History. increased, when I afterwards succeeded in rendering the same pale nitrous acid gas so absolutely black by heat, that not a ray of the brightest summer sun was capable of penetrating it.¹ Professors Miller and Daniel afterwards discovered numerous fixed lines disposed at equal distances, in the vapour of bromine and iodine, and Sir David Brewster has very recently discovered hundreds of lines under very singular circumstances, in the spectrum of an artificial substance, resembling mother-of-pearl;² but what is most interesting, these lines are *moveable, shifting their place in the spectrum by varying the incidence*, and are produced by the periodical action of *thin plates* enclosed in the substance. He has also discovered, that broad dark bands like those produced by absorbing media, but entirely different from the nearly equidistant bands formed by single thin plates, are produced by a number of thin plates in a state of combination.³

Considering the lines of the spectrum as produced by interference, Fraunhofer was induced to make a complete series of experiments on the *inflexion of light*, particularly on the splendid colours produced by gratings of wires, and grooved surfaces, which were published in the year 1822, in the *Memoirs of the Royal Bavarian Academy of Sciences*.⁴ He afterwards repeated these experiments with a finer apparatus, and communicated an account of them to the Academy of Sciences at Munich, on the 14th June 1823.⁵ The science of optics owes also to Fraunhofer the art of making the finest glass for achromatic telescopes and prisms, and such was the perfection at which he arrived, that, in a letter to the author of this article, he expresses his willingness to undertake an achromatic object glass *eighteen inches in diameter*. Our author wrote also a treatise on halos, parhelia, &c., in which he ascribes the small solar and lunar halos to the inflexion of light, by particles of vapour in the atmosphere, and the great halos of 45° to the refraction of hexagonal prisms of ice.⁶

Sir John Herschel.

Among the most distinguished contributors to optical discovery, Sir John Herschel occupies a high place. The deviations of the polarised tints from the colours of thin plates, or those of Newton's scale, had been discovered by Sir David Brewster in acetate of lead, tartrate of potash and soda, apophyllite, topaz, and various other minerals. He had divided these crystals into two classes, viz. those that had the *red* ends of the rings *inwards*, and the *blue* ends *outwards*; and those that had the *blue* ends of the rings *inwards*, and the *red* ends *outwards*.⁷ In his paper of 1818, he states, that "in almost all crystals with two axes, the tints in the neighbourhood of the resultant axes, when the plate has a considerable thickness, lose their resemblance to those of Newton's scale, as will be more minutely described in another paper." Conceiving that these deviated tints arose from the superposition of systems of rings of different colours, Sir John Herschel examined the coloured rings by homogeneous light, and established the important fact that the inclination of the resultant axes varied in the different colours of the spectrum, the poles or centres of the rings approaching to each other in red, and receding in violet light, in some crystals; while in others they receded from each other in red, and approached in violet light. In tartrate of potash and soda, for example, the inclination of the axes was 75° 42' in *red*, and only 55° 14' in *violet* light.⁸ These various axes all lie in the same plane, excepting in borax. In the paper containing this discovery, and in other

History. two,⁹ communicated to the Cambridge Philosophical Society, he has described various interesting phenomena which he discovered in different specimens of apophyllite and in hyposulphate of lime,¹⁰ and which led him to some interesting conclusions respecting the law of proportional action of these crystals on the different colours of the spectrum.

We have already seen that the force which produces circular polarisation had been deemed a property of the ultimate particles of bodies, and totally unconnected with their mode of aggregation. In 1820 Sir John Herschel made the beautiful discovery, that the direction of the circular polarisation in quartz was invariably the same with that of the plagiedral planes round the summit, the direction of the polarisation being retrograde or direct, according as these planes leant forward or backward round this summit.

We owe also to Sir John Herschel an interesting inquiry into the *aberrations of compound lenses and object-glasses*,¹¹ a series of curious experiments on the phenomena produced by diaphragms or apertures of various shapes, variously applied to mirrors and object-glasses,¹² and a great number of original views and valuable experiments, which are contained in his *Treatise on Light*, one of the most valuable and original works on science which has appeared during the last century.

M. Fresnel was, we believe, the first person who observed the change produced by heat on the tints of sulphate of lime. It is to M. Mitscherlich, however, that we owe the most complete investigation of this subject. He found that heat expands crystals differently in different directions. Iceland spar is expanded by it in the direction of its axis, while it is in a slight degree contracted in directions perpendicular to the axis. The rhomb thus approaches to the cube, and the double refraction is diminished. M. Mitscherlich also found that the inclination of the optical or resultant axes, which is about 60°, diminishes with heat till they actually form one axis, when by a farther increase of heat they again separate, and open out, as it were, in a plane at right angles to that of the laminae. We have repeated this experiment, and enjoyed the remarkable sight of observing the one system of rings marching towards the other in the plane of the laminae, and changing their form and size as they advanced.¹³ An analogous, and even a more remarkable property, was discovered by Sir David Brewster in glauberite. At the freezing point glauberite has two optical axes for all the colours of the spectrum, the inclination of the axes being *greatest* in *red*, and *least* in *violet* light. When heat is applied, the two axes approach, and those of different colours unite successively, the crystal possessing the remarkable property of being a *uniaxal* one for *red*, and a *biaxal* one for *violet* light. By increasing the temperature, the optical axes open out in the same order, but in a plane at right angles to that in which they formerly lay, and long before the temperature has reached that of boiling water the planes of the axes in all the prismatic colours are perpendicular to their first position.¹⁴ Such a crystal would form a delicate chromatic thermometer.¹⁵ M. Marx has discovered an analogous property in topaz, in which the two axes separate with heat, the variation being greater in the coloured than in the colourless varieties.¹⁶ Sir David Brewster has discovered that regular double refraction is produced in some soft substances by the application of heat.

Some very excellent and interesting results have been obtained by M. Rudberg, on the effect of heat upon doubly berg.

¹ *Edin. Trans.* vol. xii.

² *Phil. Trans.* 1837.

³ *Id. Id.*

⁴ Vol. viii. 1822.

⁵ *Edin. Journal of Science*, No. xiii. p. 101, 251.

⁶ See *Phil. Trans.* 1814, p. 204, 205, and 1820, p. 95.

⁷ *Edin. Jour. of Science*, No. xii. p. 348.

⁸ *Phil. Trans.* 1820, p. 45.

⁹ *Cambridge Trans.* vols. i. and ii.

¹⁰ Sir John discovered similar deviations in vesuvian or idocrase. — *Treatise on Light*, art. 1125.

¹¹ *Phil. Trans.* 1821, p. 222.

¹² *Treatise on Light*, § 767, 768, &c.

¹³ *Lond. and Edin. Phil. Mag.* 3d series, vol. i. p. 417.

¹⁴ *Edin. Trans.* vol. xi. p. 273, and *Lond. and Edin. Phil. Mag.* 3d series, vol. i. p. 417.

¹⁵ *Phil. Trans.* 1818, p. 108.

¹⁶ *Jahrbuch der Chemie*, vol. ix.

History. refracting crystals. He found that the extraordinary ray in calcareous spar (the line F was used) had its deviation increased $2' 34''$, as the refractive index increased 0.00043, by a rise of temperature equal to 64° , the refracting angle of the prism being $59^\circ 55' 9''$, whereas the refractive power for the ordinary ray either does not change at all, or decreases with the temperature by a quantity extremely small. In rock crystal he found the deviation to be $42''$, or 0.00027, both on the ordinary and extraordinary ray, the angle of the prism being $45^\circ 20' 5''$. In arragonite he found that the double refraction decreased a little with the temperature.¹

We owe also to M. Rudberg a series of valuable experiments on the refractive actions of the differently coloured rays in crystals with one and two axes of double refraction. His measures were taken in reference to the fixed lines in the spectrum, and the minerals he employed were rock crystal, calcareous spar, arragonite, and colourless topaz. He confirmed the existence of two dispersive powers in doubly refracting crystals, announced long before by Sir David Brewster; and the variation of the inclination of the optic axes with the different colours of the spectrum, which had also been previously discovered by Sir John Herschel.² M. Rudberg was no doubt unacquainted with the previous labours of these authors, otherwise he would not have passed them over without notice.

M. Poisson.
son.
Born 1781. Like every other branch of physical science, optics owes much to the profound researches of M. Poisson, which are in general of too recondite a nature to find a place in a popular treatise. The theory of the colours of thin plates was left incomplete by Dr. Young. The two interfering portions from the upper and under surface of the plate were obviously unequal, and therefore could not destroy one another wholly by interference, as they are found to do. M. Poisson remedied this defect by shewing that there must be an infinite number of partial reflexions within the plate, at each of which a very small portion of light was reflected, so that the sum of all these portions of light makes up for the defect of one of the pencils, and makes the interfering pencils equal. Hence M. Poisson has shewn that at a perpendicular incidence, and at points where the effective thickness of the plate is an exact multiple of the length of half an undulation, the intensity of the reflected and transmitted light will be the same as if the plate were suppressed altogether, and the bounding media in absolute contact, so that when these media have the same refractive power, no light will be reflected and the whole transmitted. By the aid of the property discovered by M. Arago, that the light is reflected in the same proportion at the first and second surfaces of a plate, M. Fresnel extended M. Poisson's conclusions to all incidences.

In treating of the subject of diffraction, M. Poisson was led to the curious result that the centre of the shadow of a small opaque circular disc, exposed to light diverging from a single point, is as much illuminated by the diffracted light as it would be by the direct light, if the opaque disc were removed. By cementing a small metallic disc upon a plate of pure and homogeneous glass, M. Arago verified this remarkable deduction of theory.

M. Poisson's researches on the propagation of motion in elastic fluids, and their application to light, are too profound to admit of a brief and intelligible analysis.

Ampère.
Born 1775. In two memoirs read to the Academy of Sciences in 1828,³ M. Ampère has made a valuable addition to the theory of Fresnel. By an indirect and not very rigorous process, M. Fresnel had been led to the equation of the wave surface;⁴ but M. Ampère obtained a direct demonstration of it, deducing the equation in the manner which Fresnel had merely indicated, and he derived from this equation the ele-

gant geometrical construction obtained indirectly by Fresnel. **History.**

The undulatory theory of light has been greatly advanced M. Cauchy. by the researches of M. Cauchy, a French mathematician of distinguished eminence. In determining the law of propagation of a plane wave, he shews that a disturbance originally limited to a given plane will give rise to three pairs of plane waves with uniform velocities, and parallel to the original plane, the two waves of each pair moving in opposite directions, but with equal velocities. He shews that the separate pairs will move with velocities represented by the reciprocals of the axes of an ellipsoid, the form of which is regulated by the position of the plane wave, and the nature of the system, the absolute displacement of the molecules being parallel to the direction of these axes. Hence a system of plane waves superposed at the point of original disturbance, will be divided into three corresponding systems, and these will generate by their superposition a curved surface of three sheets, each sheet being touched by all the plane waves of the system. If these principles are established, it will follow as a necessary consequence *that a single ray of light will be divided into three polarised rays*, one of which will in all cases have little intensity. M. Cauchy, as Professor Lloyd⁵ remarks, has not pointed out the method of discovering this ray, or stated the precise physical condition on which its existence depends; but it "would seem to arise from the circumstance that the vibration normal to the wave is not absolutely insensible, so that the actual vibrations are not accurately in the plane of the wave."⁶ "The results of M. Cauchy's general theory," continues Professor Lloyd, "embrace and confirm those of Fresnel; and the mathematical laws of the propagation of light are shewn to be particular cases of the more general laws of the propagation of vibratory motion in any elastic medium composed of attracting and repelling molecules. Considered, however, simply with reference to the theory of light, the solution given by M. Cauchy cannot, I conceive, be considered as a complete *physical* solution. In other words, the phenomena of light are not connected *directly* with any given physical hypothesis; but are shewn to be comprehended in the results of the general theory, in virtue of *certain assumed relations* among the constants which that theory involves. If, indeed, we were able to assign the precise physical meaning of these equations of condition, we should have nothing more to desire in the general theory of light; for these equations must necessarily express the characteristic properties of the vibrating medium. In this point of view, their discussion becomes a subject of the highest interest; and it is probable that the important conclusions of which we have yet to speak, may in this manner be confirmed and extended."

Before quitting this subject, however, we ought to mention that there is an essential difference between the theories of Fresnel and Cauchy. In the former a ray is said to be polarised in or parallel to any plane, when the vibrations of the molecules of ether are *perpendicular* to that line or plane; whereas, in Cauchy's theory, a ray is said to be polarised in or parallel to any plane, when the vibrations of the ether are performed in a parallel to that plane.

The inability of the undulatory theory to explain the dispersion of light, was long one of the few exceptions to its universal application. Dr. Young supposed that the material particles of bodies are incapable of permanent vibrations; that these vibrations will retard those of the ether; and that this retardation will be proportional to their frequency. The Rev. Mr. Challis, adopting Dr. Young's idea, has endeavoured to explain the manner in which the undulations of

¹ Lond. and Edin. Phil. Mag. vol. i. p. 409.

² Id. Id. vol. i. p. 1, 89, 136, 146.

³ Ann. de Chimie, tom. xxxix.

⁴ British Association, 4th report, p. 391.

⁵ British Association, 4th report, p. 391, 2.

⁶ See p. 375, (note).

History. the ether within bodies are modified by their material atoms. He supposes that a sensible reflexion takes place at every interruption of continuity in the medium; and he infers that the mean effect produced by a retarding cause proportional to the reflective power of the atoms, will be to make the condensation corresponding to a given velocity greater in a certain proportion than in free space, and to diminish the velocity of propagation in the same proportion. Mr. Airy has more recently endeavoured to remove this difficulty, by supposing that in refracting media there may be something depending on time which alters their elasticity, in the same manner as in air the elasticity is greater with a quick than with a slow vibration of particles.

An anonymous writer in a very recent number of *The Philosophical Magazine*, has proposed another hypothesis for obtaining a difference of elasticity. He supposes that the ether accumulates itself round the particles of transparent media, and forms spheres of a density increasing towards their centres; and he infers that a succession of vibrations communicated through a medium thus constituted will give rise to new vibrations propagated with various velocities corresponding to those of the different rays in the spectrum.

The complete removal of this difficulty from the undulatory theory has been effected by the skill of M. Cauchy. Regarding the sphere of action of the ethereal molecules as indefinitely small, in comparison with the length of an undulation, it had been inferred that the velocity of the undulations must be constant in the same medium; but this restriction being removed as a groundless one, M. Cauchy has considered the problem in a more general manner, and has arrived at the result, that there exists a general relation between the length of the undulations and the velocity with which they are propagated, or the index of refraction; and consequently that rays of different colours will have different degrees of refrangibility. This relation is expressed by an equation involving two arbitrary constants, depending on the nature of the medium, and determinable by two values of the index of refraction for two waves of a known length. The refractive index for waves of other lengths may then be computed. Professor Powell has done this for several media,¹ whose refractive indices for the fixed lines in the spectrum have been determined by Fraunhofer, Rudberg, and himself; but though there is a general coincidence with the theory, the differences are in some cases rather inauspicious.

M. Cauchy has more recently deduced from his general theory the remarkable fact, that in a particular case of reflexion the reflected pencil exceeds the incident one in intensity, a result which has been confirmed by direct experiment.

Mr. Airy.

In examining the two rays produced by the double refraction of quartz, Mr. Airy was led to a discovery which we consider as one of the most important in its results, and one of the most beautiful in its phenomena, that has yet been made in this branch of optics. The circular polarisation of the two rays along the axis of quartz had been studied by different philosophers, and had been explained by Fresnel with singular ingenuity, on the principles of the undulatory theory. No attempt, however, had been made to account for the existence of this property only in the rays which pass near the axis of the crystal, or to define the limit where the circular polarisation ended, and the plane polarisation commenced. Fresnel, and all who have written on the subject, seem to have shrunk from this difficulty; but Mr. Airy thought that the two kinds of polarisation must have some connecting link, and by the aid of theory and experiment he succeeded in discovering it. In place of the two rays in quartz consisting of plane polarised light, as was

universally believed, Mr. Airy has shewn that they both consist of elliptically polarised light, the greater axis of the ellipse for the one ray being in the principal plane of the crystal, and the greater axis of the other perpendicular to that plane. One of the rays he found to be right-handed elliptically polarised, and the other left-handed elliptically polarised. The proportion of the axes of the ordinary ray is more nearly one of equality than the proportion of the axes of the extraordinary ray, each proportion being one of equality when the direction of the ray coincides with the axis, and becoming more unequal with the inclination, according to a law not yet discovered. The results calculated from the theory are in perfect accordance with those which Mr. Airy has obtained from very nice and difficult experiments; so that we may regard this beautiful and singular property of the two rays of quartz as perfectly established.

Without knowing of the beautiful experiments of M. Arago, already referred to, Mr. Airy was led to make the same experiment on the coloured rings formed between a lens and a metallic reflector, and to draw the same conclusion from it in favour of the undulatory theory. From a consideration of the formulæ of Fresnel, Mr. Airy was led to expect that if the rings were formed between two substances of different refractive powers, such as plate glass and diamond, the light being polarised perpendicular to the plane of incidence, they should have a black centre at incidences less than the polarising angle of the glass, and greater than the polarising angle of the diamond; while they should have a white centre at all intermediate angles. These anticipations Mr. Airy confirmed by experiment; and in the course of his observations he observed certain peculiarities in the phenomena, from which he has drawn the following conclusions, viz.

1. When the angle of incidence is less than the maximum polarising angle of the diamond, the nature of its reflexion is similar to that of metallic reflexion; the phase of vibration in the plane of reflexion being more retarded than that of vibrations perpendicular to the plane of reflexion, but perhaps by a smaller quantity than in reflexion from metals.

2. In the neighbourhood of the polarising angle, the nature of the reflexion is different from any that has hitherto been described. The vibrations in the plane of reflexion do not vanish, but on increasing the angle of incidence by three or four degrees, the phase of vibration is gradually retarded by about 180°. In the reflexion of light whose vibrations are perpendicular to the plane of reflexion, there is no striking difference between the effects of diamond and those of glass.

3. For angles of incidence greater than the polarising angle, there is no sensible difference between the effects of diamond and those of glass.²

It would be desirable to ascertain if the diamond used by Professor Airy consisted of strata of different reflective and refractive powers, a structure lately discovered in some specimens by Sir David Brewster;³ or if it was a heterogeneous crystal, containing particles of different degrees of density and double refraction, a structure very common in this gem.⁴

Hitherto the mathematical theory of light owed almost all its development to the distinguished members of the Institute of France—to Malus, Arago, Fresnel, Poisson, Ampère, and Cauchy; but it was now destined to receive a powerful impetus from those eminent members of Trinity College, Dublin, who have nobly sustained the honour of their country by their genius and discoveries. In his *Essay on the Theory of Systems of Rays*, Sir William Hamilton has given an elegant analytical form to that part of the theory of Fresnel which relates to the determination of the velocity and polarisation of a plane wave; and he has de-

History.

Sir Wm. Hamilton.

¹ *Phil. Trans.* 1835-37.

² *Cambridge Trans.* 1832.

³ *Treatise on the Microscope*, p. 19.

⁴ See the *Art. MICROSCOPE*, vol. xv. p. 30, and *Edin. Trans.* vol. viii. p. 157.

History. deduced the velocity and direction of the ray from that of the wave, and consequently the form of the wave surface.¹ In these researches Sir W. Hamilton was conducted to the discovery of some new geometrical properties of the wave surface. He found that this surface has four conoidal cusps at the extremities of the resultant or optical axes, at each of which the wave is touched by an infinite number of tangent planes, forming a tangent cone of the second degree, while at the extremities of the lines of single wave velocity, there are four circles of plane contact, in every part of each of which the wave surface is touched by a single plane. These cusps and circles, the existence of which does not seem to have been suspected by Fresnel, have led Sir W. Hamilton to some remarkable theoretical conclusions respecting the laws of refraction in biaxial crystals. To this new property he has given the name of conical refraction, because a single ray is refracted into an infinite number, forming a kind of cone. This conical refraction is of two kinds, external and internal. In external conical refraction, one internal cusp ray corresponds to an external cone of rays; and in internal conical refraction, an external ray incident at an angle corresponding to the line of single wave velocity within, is connected with an internal cone of rays.²

Professor
Lloyd.

Sir W. Hamilton requested Professor Lloyd, of Trinity College, Dublin, to inquire experimentally into the existence of these two kinds of conical refraction. For this purpose he selected arragonite, a crystal of great biaxial energy, and having its optic axes inclined about 20° . It was cut with parallel faces perpendicular to the line bisecting the two optic axes. Upon looking at the light of a distant lamp through the crystal, and in the direction of one of the optical axes, Professor Lloyd saw a point more luminous than the space immediately about it, and surrounded by something resembling a stellar radiation. Hence the direction of the optical axes may be determined by this modification of common light. When the adjustment was perfected, and the light transmitted in the exact direction of the cusp ray, there appeared at first a luminous circle, with a small dark space in the centre, and in this dark central space were two bright points, separated by a narrow and well-defined dark line. These appearances rapidly changed in shifting the minute aperture next the eye. On examining the emergent cone with a plate of tourmaline, Professor Lloyd was surprised to observe that only one radius of the circular section vanished in a given position of the tourmaline, and that the vanished ray ranged through 360° , while the tourmaline was turned through 180° . Hence it follows that all the rays of the cone are polarised in different planes. On a more attentive examination of this phenomenon, Professor Lloyd discovered the remarkable law, "that the angles between the planes of polarisation of any two rays of the cone is half the angles between the plane containing the rays themselves and the axis." This law he found to be in perfect accordance with the theory.

The verification of the second kind of conical refraction Professor Lloyd found to be more difficult. The angle of the cone of rays which theory indicated, should be seen within the crystal when a single external ray corresponding with a ray refracted along an optical axis, was $1^\circ 55'$ in arragonite. The external ray was divided into two, but when the critical incidence was gained, after much care in the adjustment, Professor Lloyd "at last saw the two rays spread into a continuous circle, whose diameter was apparently equal to their former interval.

History. "This phenomenon was exceedingly striking. It looked like a small ring of gold viewed upon a dark ground; and the sudden and almost magical change of the appearance from two luminous points to a perfect luminous ring, contributed not a little to enhance the interest.

"The emergent light, in this experiment, being too faint to be reflected from a screen, I repeated the experiment with the sun's light, and received the emergent cylinder upon a small piece of silver paper. I could detect no sensible difference in the magnitude of the circular sections at different distances from the crystal.

"When the adjustment was perfect, the light of the entire annulus was white, and of equal intensity throughout. But when there was a very slight deviation from the exact position, two opposite quadrants of the circle appeared more faint than the other two, and the two pairs were of complementary colours. The light of the circle was polarised, according to the law which I had before observed in the other case of conical refraction. In this instance, however, the law was anticipated from theory by Professor Hamilton."

In addition to these interesting results, Professor Lloyd has published an account of a new case of interference, in which the experimental exhibition of the fact is much more manageable than in the experiment of two slightly inclined mirrors given by Fresnel. Professor Lloyd causes the light reflected at an angle of 90° from the surface of a single piece of plate glass or a metallic reflector, to interfere with the direct light that passes parallel to the reflecting surface and near it. A screen placed on the other side of the mirror receives the direct and the reflected pencils, which, meeting under a small angle, after having traversed paths differing by a small amount, interfere. Professor Lloyd also received the two pencils upon an eye-piece placed at a short distance from the reflector, and saw a very beautiful system of bands, in every respect similar to one half of the system formed by the two mirrors in Fresnel's experiment.

Professor Lloyd has more recently, in 1836 and 1837, communicated to the Royal Irish Academy the results of his researches, *On the propagation of light in uncrystallised media*. His object was to simplify and develop that part of M. Cauchy's theory, which relates to the propagation of light in an ethereal medium of uniform density, and to extend the same theory to the case of the ether enclosed in uncrystallised substances, taking into account the action of the internal molecules. In the first part of his memoir, Professor Lloyd has given good reason for concluding that the theory in its present form is insufficient to explain the phenomena of light in bodies, and that it becomes necessary to take into account the action of the material molecules. In doing this he limits himself to the comparatively simple case, in which the molecules of the ether and the body are uniformly diffused. In the expression for the velocity of propagation, each term consists of two parts, one of which is due to the action of the ether, and the other to that of the body. "It is not improbable," says Professor Lloyd, "that there may be bodies for which the first or principal term is nearly nothing, the two parts of which it is composed being of opposite signs, and nearly equal. In this case the principal part of the expression for the velocity will be that derived from the second term; and, if that term be taken as an approximate value, it will follow, that the refractive index of the substance must be in the subduplicate ratio of the length of the wave nearly. Now, it is remarkable that this law of dispersion, so unlike any

¹ The wave surface is a geometrical surface employed to determine the direction and the velocity of reflected and refracted rays. It is spherical in a singly refracting medium; a double surface or one of two sheets in a doubly refracting medium; and a surface of three sheets, on the supposition that there is a triple refraction. It has always a centre round which it is symmetrical; and the radii drawn from this centre in different directions represent the velocities of rays to which they are parallel.—*Maccullagh's Irish Trans.* vol. xvii.

² *Irish Trans.* vol. xvii. p. 136.

³ *Phil. Trans.* 1830, p. 325, or *Edin. Journal of Science*, N. S., No. viii. p. 259.

History. thing observed in transparent media, agrees pretty closely with the results obtained by Sir David Brewster in some of the metals. In all these bodies the refractive index (inferred from the angle of maximum polarization) *increases* with the length of the wave. Its value for the red, mean and blue rays, in silver, are 3.866, 3.271, 2.824, the ratios of the second and third to the first, being .85 and .73. According to the law above given, these ratios should be .88 and .79.

We are indebted also to Professor Lloyd for an admirable history *Of the progress and present state of physical optics*, published in the *Fourth Report* of the meeting of the British Association, held in Edinburgh; a history not less characterised by its candour and truth, and absence of all national partiality, than by the profound and accurate knowledge of the subject which it everywhere displays. The only cultivator of physical optics to whom Professor Lloyd has done injustice is himself; and we are glad of the opportunity which we here enjoy, of giving a brief and imperfect account of his original and valuable researches.

Professor
Maccul-
lagh.

It is with no less pleasure that we proceed to give an account of the optical discoveries of another Irish philosopher, who, at an early period of life, has placed himself in a distinguished position both as a mathematician and a natural philosopher. We have already seen that M. Ampère gave a direct demonstration of Fresnel's construction for finding the surface of the wave. His solution, however, was extremely difficult and complicated. Mr. James Maccullagh was led in 1829 to believe, from the simplicity and elegance of the results, that there must be some simpler method of arriving at them, and, upon considering the subject with attention, he was led to a concise demonstration of the same theorem, and of some of the other leading points of Fresnel's theory. He has demonstrated a geometrical construction for finding the magnitude and direction of the elastic force arising from a displacement in any direction, and by his construction, with the aid of a few lemmas, he is immediately led to all the conclusions established by M. Fresnel. The magnitude and direction of this force are represented by means of an ellipsoid, having for its semiaxes the three principal indices of the medium, these axes coinciding in direction with, and being inversely proportional to, the axes of Fresnel's generating ellipsoid.

The properties of the wave surface and its use in determining the directions and velocities of reflected and refracted rays, seem to have been discovered independently by Sir W. Hamilton, M. Cauchy, and Mr. Maccullagh, and in a paper entitled, *Geometrical propositions applied to the wave theory of light*, he has applied the properties of that surface to the geometrical development of the theory of double refraction.

Hitherto the remarkable laws of the double refraction of quartz, developed by the successive labours of Arago, Biot, Fresnel, and Airy, were merely a set of independent facts unconnected by any theory; but Mr. Maccullagh in a paper *On the laws of the double refraction of quartz*, sent to the Royal Irish Academy, in February 1836, has shewn how they may be explained hypothetically, by introducing differential coefficients of the third order into the equations of vibratory motion.

The theory of the action of the metals upon light having been long among the desiderata of physical optics, Mr. Maccullagh thought that it would be important to represent the phenomena of elliptic polarisation, discovered by Sir David Brewster, by means of empirical formulæ, in a manner analogous to that employed by Fresnel in the case of total reflexion. Mr. Maccullagh has applied his formulæ to steel, and in computing from it the intensity of light re-

flected when common light is used, he obtained the remarkable result, that the intensity decreases very slowly up to a large angle of incidence (less than 75°), and then increases up to 90° , where there is total reflexion. This result entirely accords with the remarkable fact discovered by Mr. Potter,² that the intensity decreases with the angle of incidence as far as 70° . Mr. Maccullagh conceives that experiments alone can decide whether the subsequent increase indicates a real phenomenon, or arises from an error in the empirical formulæ.

Mr. Maccullagh deduces also from his formulæ the phenomenon observed by Mr. Airy in the diamond; and he has applied it successfully to the phenomena discovered by M. Arago, respecting the rings formed between a transparent and a metallic surface. In this experiment Mr. Maccullagh and Prof. Lloyd have both discovered a curious appearance unnoticed by any other author. Through the last twenty or thirty degrees of incidence, the first dark ring surrounding the central spot, which is comparatively bright, remains constantly of the same magnitude, though the other rings dilate greatly by an increase of incidence.

Hitherto the undulatory theory had been unable to give any explanation of the variation of the polarising angle, when the light was reflected in different azimuths from calcareous spar, and other doubly refracting surfaces. Mr. Maccullagh, however, was induced to exercise his mathematical skill on this interesting subject; and so early as 1834, he communicated to Professor Lloyd an expression for the angle of polarisation at the surface of crystallised media, when the plane of reflexion coincides with the principal section of Fresnel's ellipsoid; and he found that the law, which he extended by analogy to all cases, represented with much exactness the observations of Sir David Brewster.³ In a subsequent paper, *on the laws of reflexion from crystallised surfaces*,⁴ he has explained the principles upon which his formula is founded. He was obliged to adopt the view of Cauchy, that the vibrations of polarised light are parallel to its plane of polarisation, and being embarrassed by his third ray, he altered Cauchy's six equations of pressure, so as to make them afford only two rays, and give a law of refraction exactly the same as Fresnel's.

It appears, from a subsequent paper of Mr. Maccullagh's,⁵ that M. Seebeck⁶ had solved the same problem long before, namely, in the case where the plane of incidence coincides with the principal section of the crystal, and had confirmed its accuracy by experiment. M. Seebeck had also pointed out a defect in Mr. Maccullagh's formulæ, No. 2 and 3, which induced the latter to resume the subject; and in a new paper read to the Irish Academy on the 9th January 1837, a solution of the following problem is given for the first time:—"Supposing a ray of light, polarised in a given plane, to fall on a doubly refracting crystal, it is required to find the plane of polarisation of the reflected ray, and the proportion between the amplitudes of vibration in the incident, the reflected, and the two refracted rays." The hypotheses employed by our author are these, viz.

1. The density of the ether is the same in all media.
2. The vibrations are parallel to the plane of polarisation.
3. The *vis viva* is preserved.
4. The vibrations are preserved; that is, the resultant of the incident and reflected vibrations are the same as the resultant of the refracted vibrations. "This theory," says the author, "represents very accurately the experiments of Sir David Brewster and M. Seebeck, on the light reflected in air from a surface of Iceland spar."

We owe also to Mr. Maccullagh some interesting views

¹ *Irish Transactions*, vol. xvii.

² Professor Lloyd's *Report on Physical Optics*, in the *Fourth Report of the British Association*, 1834, p. 374, (note).

³ *Lond. and Edin. Phil. Mag.* vol. viii. p. 103.

⁴ *Id.* vol. x. p. 42.

⁵ *Edin. Journal of Science*, N. S. No. 4.

⁶ Poggendorff's *Annalen*, 1836, No. 6.

History. respecting the nature of the light transmitted by the diamond and by gold leaf. He conceives that there is a change of phase produced by refraction, as well as by reflexion, from these bodies, the change being different according as the light is polarised in the plane of incidence, or perpendicular to it. If the incident ray, therefore, is polarised in any intermediate plane, the refracted ray should be elliptically polarised, which was found to be the case in gold leaf. He conceived that the same remark explains the appearance of double refraction in specimens of the diamond which give only a single image, and that other precious stones are likely to have similar properties. Our author has obtained a general formula for the difference of phase between the two component portions of the refracted light, one polarised in the plane of incidence, and the other perpendicular to it. He finds from this formula, that the difference of phase, which is nothing at a perpendicular incidence, increases until it becomes equal to the characteristic, at an incidence of 90° ; and when the light emerges into air, the difference of phase is doubled. In submitting this formula to the test of experiment, which Mr. Maccullagh has not yet done, it will be requisite to ascertain that the diamond is not composed of strata of different refractive powers.¹

M. Lamé. M. Lamé, an eminent professor in the Polytechnic School, has recently endeavoured to determine the laws according to which the molecules of ether and of bodies act upon each other. He arrives at the conclusion that "the action of ponderable matter upon the ether varies in the inverse ratio of the square of the distance, and that the elasticity of the ether itself is proportional to its density." He concludes that the retardation of the vibratory motion, in penetrating into a dense body, will be greater the less the length of an undulation; so that the refraction will be greater for the shorter undulations, a result which he regards as the true explanation of dispersion.

"M. Lamé," says Professor Lloyd, "has endeavoured to connect the phenomena of double refraction with an assumed constitution of the ethereal fluid. He takes the case in which the ether is supposed to be distributed round the molecules of the body in confocal ellipsoidal shells; and he concludes that a vibratory movement, propagated from a vacuum into a body so constituted, will be separated, at its entrance, into two component movements, which will advance with different velocities.

"The two component vibrations, he finds, will be at right angles, and parallel to the lines of greatest and least curvature of the elementary ellipsoids. Thus, the bifurcation of a ray of light on entering a crystallised medium, and the opposite polarisation of the two pencils, are found to be consistent with a molecular constitution such as that described.

"These results are of the highest interest, and will, no doubt, receive an early examination from those engaged in the same department of analysis. Their author seems to be persuaded that his methods will lead him to the mathematical laws of other phenomena, which he conceives to depend, in like manner, on the motions of the ethereal fluid."²

In a memoir more recently communicated to the Academy of Sciences, M. Lamé has sought to determine the mode of vibration of the ethereal particles which surround the material molecules in concentric spherical shells of decreasing density. He considers transparent homogeneous bodies as consisting of a multitude of such molecules, distributed uniformly in space, and at distances incomparably greater than their diameter; and he conceives that the waves propagated from the molecules adjoining to the surface of emergence, will produce by interference phenomena resembling the fixed lines in the spectrum.³ This opinion, however, is in our opinion, incompatible with the actual phenomena of fixed lines.

Introduction. The narrowness of our limits will not permit us to record in this historical sketch many other discoveries which have been recently given to the world, though many of them will be detailed under the heads to which they respectively belong. These discoveries have been made principally by Mr. H. F. Talbot, Mr. Potter, Mr. Dove, and other philosophers.

Having thus given a condensed sketch of the history of optical discovery, from the earliest to the present times, we shall now proceed to the proper subject of this article. As the nature of this work requires that the subject be treated in a very popular manner, we shall pass briefly over those branches of Optics which are generally treated mathematically, and which occupy a prominent part in all ordinary treatises, and occupy our limited space with the more interesting departments of Chromatics, Physical Optics, the Double Refraction and Polarisation of Light, the Explanation of Natural Phenomena, the Laws of Vision, and the Construction of Optical Instruments.

INTRODUCTION.

THE ancients confounded the phenomena of vision with those of light, by supposing that when we see external objects something passes from the eye to the object. The phenomena of light, however, are totally independent of those of vision, and have a real existence in nature, whether we suppose them to be objects of vision or not.

1. Light is the element by means of which we see external bodies. These bodies may be divided, in reference to light, into two classes, *self-luminous* and *non-luminous*, or dark bodies. The first class include the sun, the stars, flames of all kinds, and bodies which become luminous by friction, heat, and electrical and magnetical action. Such bodies become visible by the light which they themselves emit, and we then obtain a knowledge of their apparent form. The sun, for example, is seen to be round, and the flame of a candle to be of a conical shape. The second class of bodies, however, are never visible but when placed in the light of self-luminous bodies. It includes the moon and all the primary and secondary planets, of which we see only those portions upon which the sun's light directly falls, and all the other objects upon our own globe. When we bring a lighted candle into a room its light falls upon all the objects in the apartment, and they become visible. These bodies reflect or throw back the light of the candle, and they scatter it in all directions, because they are, generally speaking, visible, wherever we place our eye. But objects also become visible by the light thrown off by non-luminous. When the moon has the form of a sharp crescent, we see the obscure part of its circular disc by the light thrown upon it from the earth, which is at that time almost fully illuminated by the sun. In like manner in the room lighted with a candle, objects are seen in corners and places upon which the light of the candle does not fall. These objects, however, are illuminated by the light of the candle thrown back by the white ceiling and walls of the apartment; and hence the reason why the ceilings and apartments should always be white, and why the walls should be white if we wish to obtain the greatest quantity of light from a given flame.

2. The light thrown off from all bodies whether self-luminous or non-luminous, is of the same colour as themselves. A red hot body, or a stick of red sealing wax, will make a sheet of white paper appear red if held near them.

3. But though coloured bodies throw off light of the same colour with themselves, bodies do not appear of the same colour as that of the light which falls upon them. All

¹ See page 27.
VOL. XVI.

² See Professor Lloyd's *Report*, p. 303.

³ *Id. Id.* (note), and *Ann. de Chimie*, tom. lviii.
3 B

Introduc-
tion.

bodies which are white in white light, appear of the same colour as that of the light which falls upon them; but other bodies, such as red wax, appear red even in white light, a property which they derive from a peculiar structure acting upon the different colours of which white light is composed. Bodies of this kind when illuminated with lights of different colours, always appear brightest in light of the same colour which they exhibit in white light. Thus a stick of yellow wax is more luminous than a stick of red wax, but the yellow wax will be less luminous than the red wax if we illuminate them both with red light.

4. Bodies in their relation to light, are divided into two classes, *opaque* and *transparent*. An *opaque* body is one that stops the light that falls upon it, such as a piece of coal, or a plate of silver; and a *transparent* body is one which transmits the light through it, such as glass, water, and air. The most opaque body, however, may be made transparent by making it sufficiently thin, and the most transparent one may become opaque by making it sufficiently thick.

5. The opacity of bodies, or their power of intercepting light, gives rise to what is called the *shadows* of bodies. As the shadows of bodies are of the same size as the bodies, we thence deduce the fundamental optical fact, *that light moves in straight lines*. The same fact may be proved in a thousand ways, but most simply by placing three small holes in a straight line. In this case the light will pass through them, but if any one of them deviates from the straight line, the light will be stopped. The same thing is finely seen without any experiment, by admitting light into a dark room through an aperture of an inch wide. Its path, marked out by the floating dust which it illuminates, will be seen to be a straight line.

6. Light issues or radiates in every direction and from every point in the surface of luminous and visible bodies. This fact is proved by the circumstance, that we see such bodies wherever we place our eye. However much we may magnify the bright part of the sun's disc through a telescope, or a sheet of white paper through a microscope, we shall never see any points destitute of light.

7. Light consists of separate and independent *parts*, which, when reduced to the smallest magnitude, are called *rays of light*. A beam of light transmitted into a dark room may be actually divided into smaller portions in a variety of ways. The smallest portion that we can allow to pass may be called a ray of light, and possesses the same properties as the larger beam.

8. *Light moves at the rate of 192,000 miles in a second*. This extraordinary property of light has been deduced by direct calculation from the immersions and emersions, in eclipses of Jupiter's satellites, which become visible to us nearly a quarter of an hour earlier when the earth is nearest Jupiter, than when it is farthest from that planet. The exact velocity of light obtained in this manner, is 192,500 miles in a second; whereas, Dr. Brinkley and M. Struve have found it to be 191,515 miles in a second, from the phenomena of aberration.¹ This last determination is undoubtedly the most correct. The mean, however, of 192,000 is most easily remembered.

The velocity with which light travels is so inconceivable, that we require to make it intelligible by some illustrations.

It moves from the sun to the earth in $7\frac{1}{2}$ minutes, whereas a cannon ball fired from the earth, would require *seventeen years* to reach the sun.

Light moves through a space equal to the circumference of the earth, or about 25,000 miles in about the 8th part of a second. The swiftest bird would require *three weeks* to perform this journey.

Light would *demonstrably* require *five years* to move

from the *nearest* fixed star to the earth, and *probably* many Catoptrics thousand years from the most remote star seen by the telescope. Hence if a remote visible star had been created at the time of the creation of man, it may not yet have become visible to our system.

9. When light falls upon any body, whether rough or smooth, coloured or uncoloured, a part of the incident light enters the body, and is either lost within it, or transmitted through it; and part of it is reflected from its surface, either in the same or in a different direction from that in which it came. The light which enters the body and is lost, the light which is transmitted through the body, and the light which is reflected from it, suffer certain changes in its direction, and in its physical properties. It belongs to the *geometrical* or mathematical part of optics, to assign the laws which regulate the change of direction which light experiences when it is transmitted through, or reflected from bodies, whose density is uniform, and whose surfaces have a geometrical form; and to *physical* optics, to explain the changes in the physical properties which light acquires in passing through bodies, in passing near them, or in being reflected from their surfaces.

The laws or rules which regulate the reflexion of light, constitute that branch of optics which is called *catoptrics*, and the laws which regulate the changes of deviation which light experiences when transmitted through bodies, is called *dioptrics*.

PART I. CATOPTRICS, OR THE REFLEXION OF LIGHT.

The word *catoptrics*, derived from the Greek words *kata* Catoptrics. *from*, and *ὀπτομαι*, *to see*, signifies that department of optics which treats of the reflexion of light from the polished and regularly formed surfaces of bodies, such as *water*, *glass*, and the *metals*.

The name of *speculum* or *mirror*, has commonly been given to bodies that have regularly formed and highly polished surfaces. The word *speculum* is generally applied to polished metals, and *mirrors* to reflectors made of glass and covered with an amalgam of tin and mercury, to increase their power of reflecting light.

There are four kinds of specula used in optics, namely, *plane*, *convex*, *concave*, and *cylindrical*, and when light falls upon any of these specula, which we shall always consider to be formed of polished metal, it is reflected according to the same law.

General Law of Reflexion.

Let AD be a ray of light which falls upon a *plane speculum* MN, and strikes it at the point D, this ray will be driven back in the direction DB, so inclined to the original ray AD that if we raise from the point D a line DE perpendicular to MN, the angle BDE will be equal to the angle ADE. The ray AD is called the *incident ray*, DB the *reflected ray*, ADE the *angle of incidence*, and BDE the *angle of reflexion*. The two rays AD, DB, and the perpendicular DE, all lie in the same plane AEBD. This plane is sometimes called the *plane of incidence*, and sometimes the *plane of reflexion*, and it is always at right angles to the reflecting surface MN.

When the reflecting surface is *concave* as MN in fig. 2, and is part of a sphere, whose centre is C, a ray of light AD falling upon any point D, will be reflected in a direction DB, so as to form the same angle BDC with a line CD drawn from the cen-

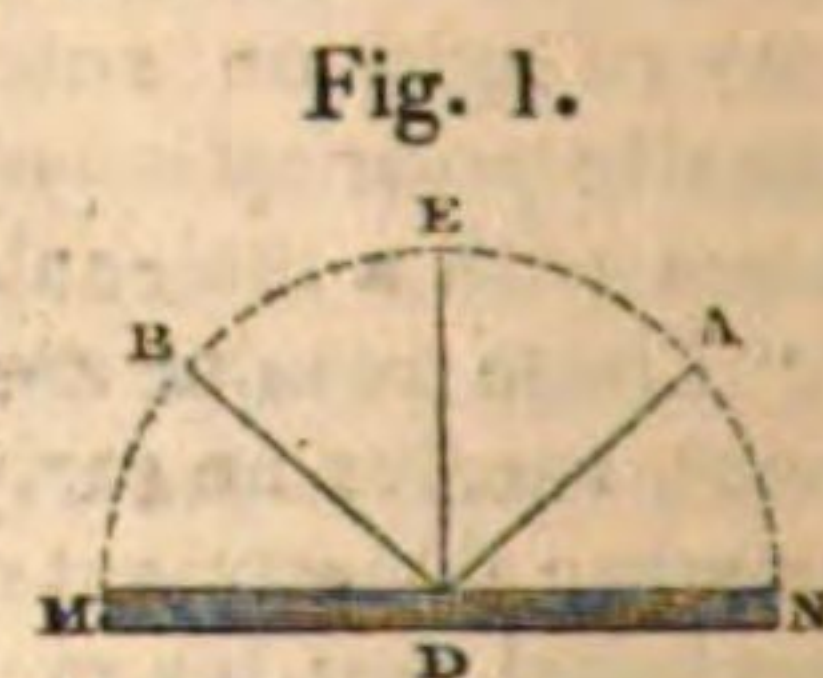


Fig. 1.

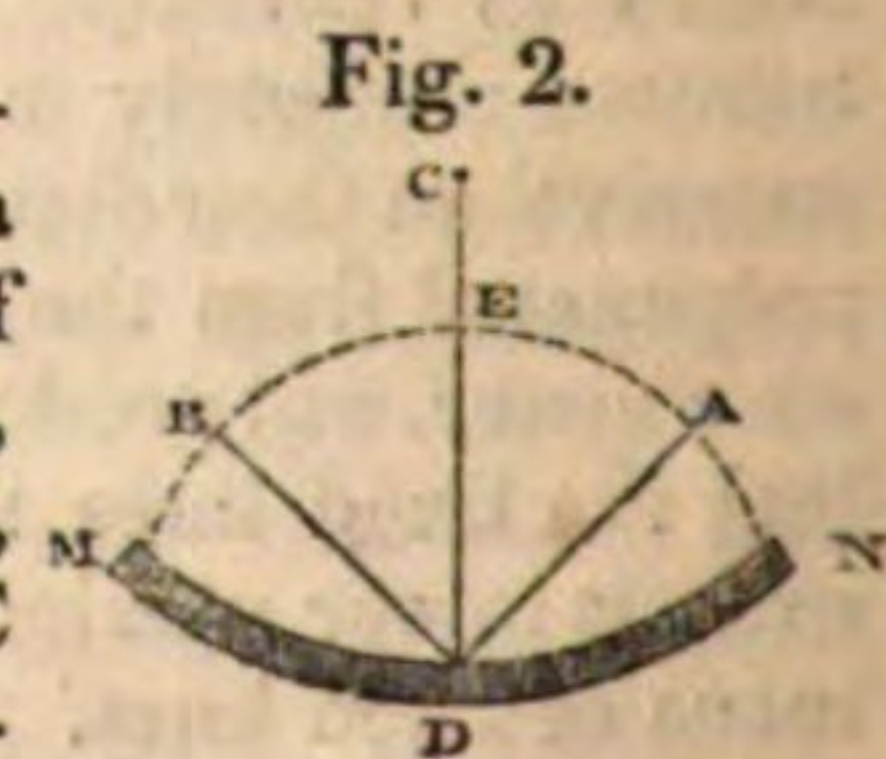


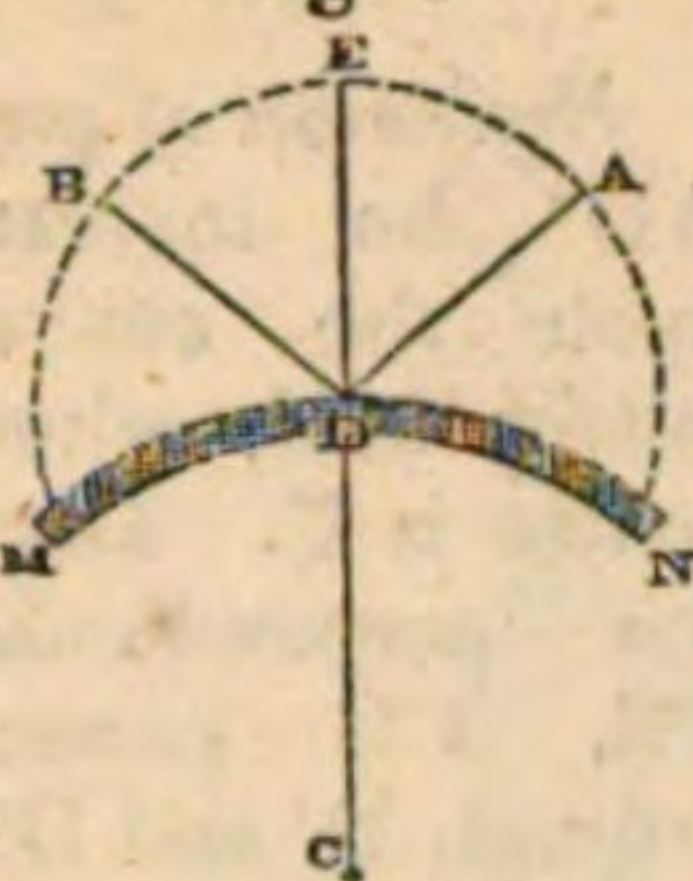
Fig. 2.

¹ See ABERRATION, vol. i. p. 31.

Catoptrics. tre of the sphere to the point of incidence D, that the incident ray AD does, viz. the angle ADC. In this case the line DC is perpendicular to the reflecting surface at D.

When the speculum is *convex* as in fig. 3, and C the centre of its spherical surface, then if we draw CE, passing through any point D, of the spherical surface MN, any ray of light AD, incident at D, will, after reflection, take a direction DB, having the same inclination BDE to DE, that the incident ray AD has. In this case, also, the prolonged radius of curvature CE, is perpendicular to the surface MN at D.

Fig. 3.



When the surface is cylindrical, the form of the reflecting line, or the line lying in the plane of reflexion, is a circle in one direction, a straight line in another, and an ellipse in all intermediate ones, but in every case the reflected ray will take such a direction that the angle which it forms with a line perpendicular to a plane touching the cylinder at the point where the ray strikes it, will be equal to the angle which the incident ray forms with the same perpendicular. This is true of all curved surfaces whatever.

The results now stated have been established by direct experiment for all inclinations of the incident ray, so that it is a law universally true, that in the reflexion of light *the angle of incidence is equal to the angle of reflexion*. Hence it follows, that when the incident ray is perpendicular to any surface, it is reflected back in the direction in which it came, and when the incident ray is parallel to the reflecting surface, (when plane) or is inclined 90° to it, it will pass on without suffering any change in its direction.

The equality of the angles of incidence and reflexion is finely seen in the game of Billiards, in the reflexion of a hand-ball from a wall, and in the reflexion of sound.

By means of the law of reflection we can easily determine, even without any calculation, the effects produced upon light by specula and mirrors, and the shape, and magnitude, and position of the images of all objects seen by reflexion from them. These effects we shall now proceed to consider in their order.

DEFINITIONS. *Parallel rays* are those which are parallel or equidistant, as AD, A'D', fig. 4.

Diverging rays, are those which issue or diverge from a point, and separate from each other, forming an angle as AD, AD', AD'', fig. 5.

Converging rays, are those which *converge* to a point, or approach to one another, as AD, A'D', A''D'', fig. 6.

SECT. I.—On the Reflexion of rays from Plane Mirrors.

Reflexion of parallel rays.

When parallel rays AD, A'D' fall upon a plane speculum MN at the points D, D' they will preserve their parallelism after reflexion. Drawing the perpendiculars DE, D'E, make the angles of reflexion EDB, E'D'B' equal to the angles of incidence ADE, A'D'E', and it will be found that DB is parallel to D'B'. If the space between AD, A'D' be supposed to be filled up with other rays parallel to AD, the space between DB and D'B' will also be filled up with parallel rays. Hence a beam of parallel rays ADD'A', will be reflected into the parallel beam DB D'B', the latter being the same as the former but inverted. If the inverted beam suffers another reflexion from another mirror, parallel to MN, it will be restored to a position exactly parallel to AA'DD', and no longer inverted.

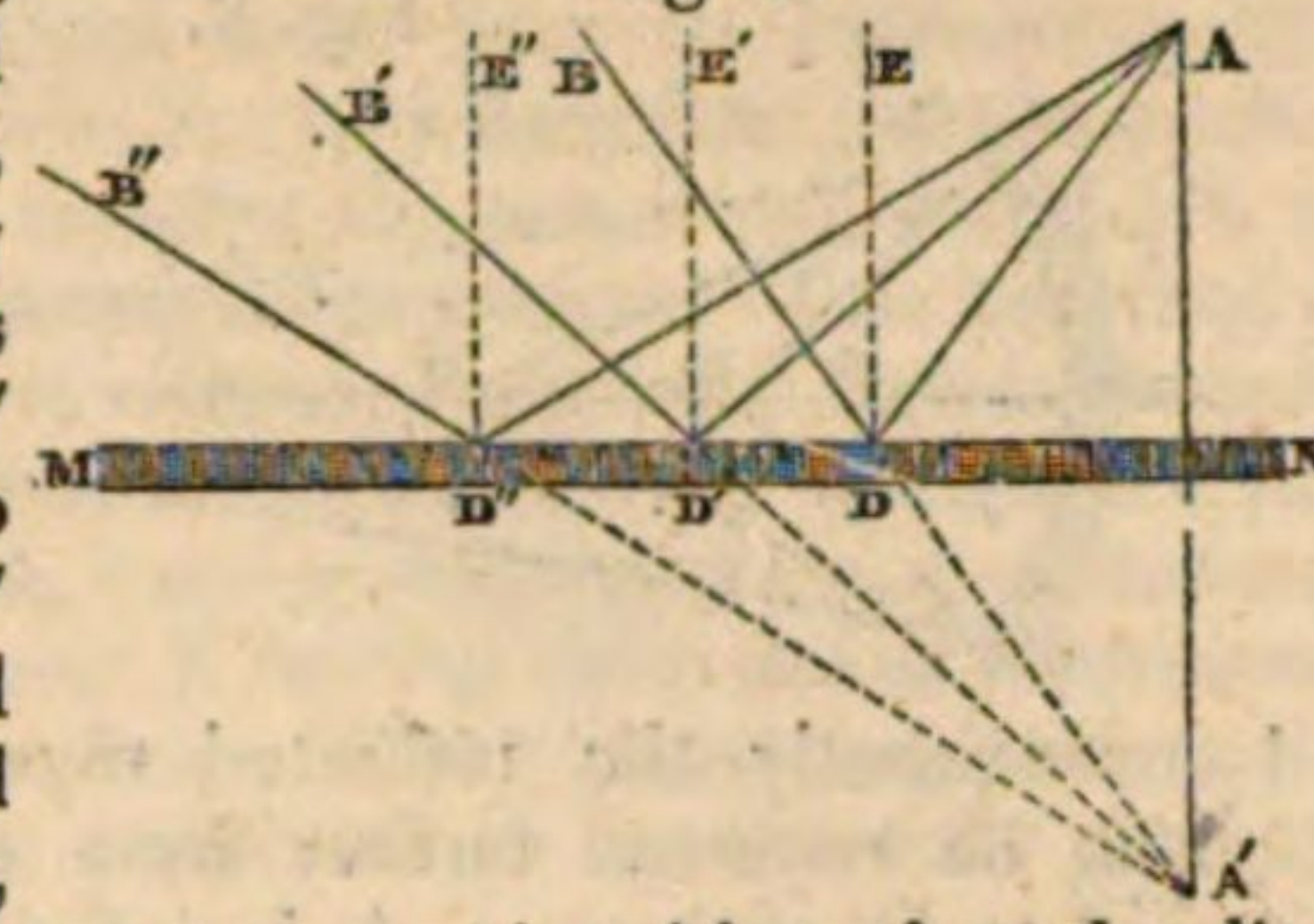
Fig. 4.



Reflexion of diverging rays.

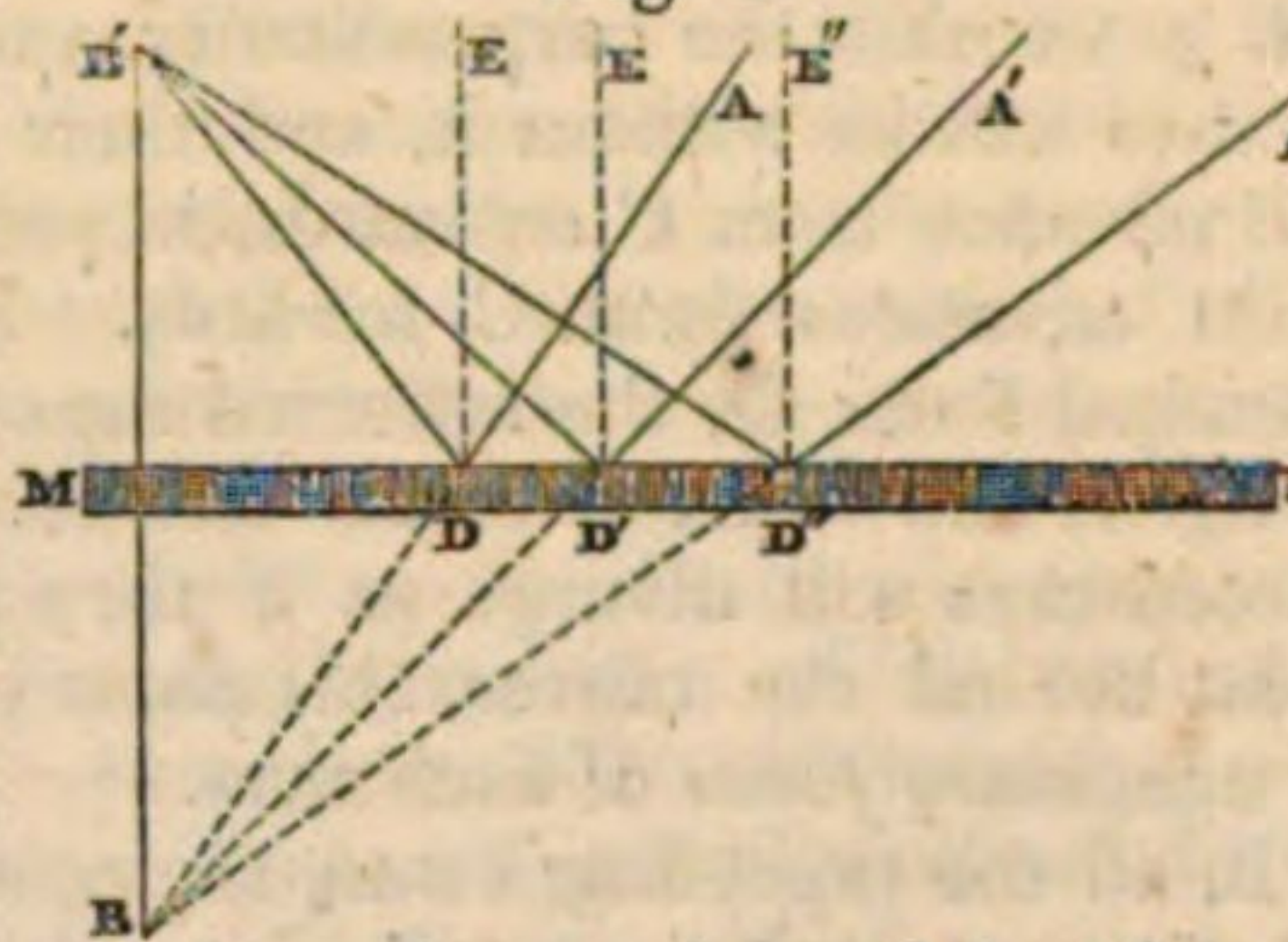
When diverging rays, AD, A'D', A''D'', fall upon a speculum MN, they will be reflected in directions DB, D'B', D''B'' found by making the angles BDE, B'D'E, B''D''E'' respectively equal to ADE, A'D'E', A''D''E'', and the reflected rays being continued back till they meet, they will be found to meet at a point A' so that the line AA' is at right angles to MN, and AN equal to A'N. Hence the rays will have the same divergency after reflexion, as before it, and as if they came from A', the reflected beam being inverted, as in the preceding case.

Fig. 5.



Reflexion of converging rays. When converging rays AD, A'D', A''D'', fall upon a speculum MN, they will converge after reflexion to a point B', so situated, that if BB' is at right angles to MN, B'M will be equal to BM. The reflected rays DB, D'B', D''B'', will be found by making the angles EDB, E'D'B', E''D''B'', respectively, equal to the angles of incidence, ADE, A'D'E', A''D''E''.

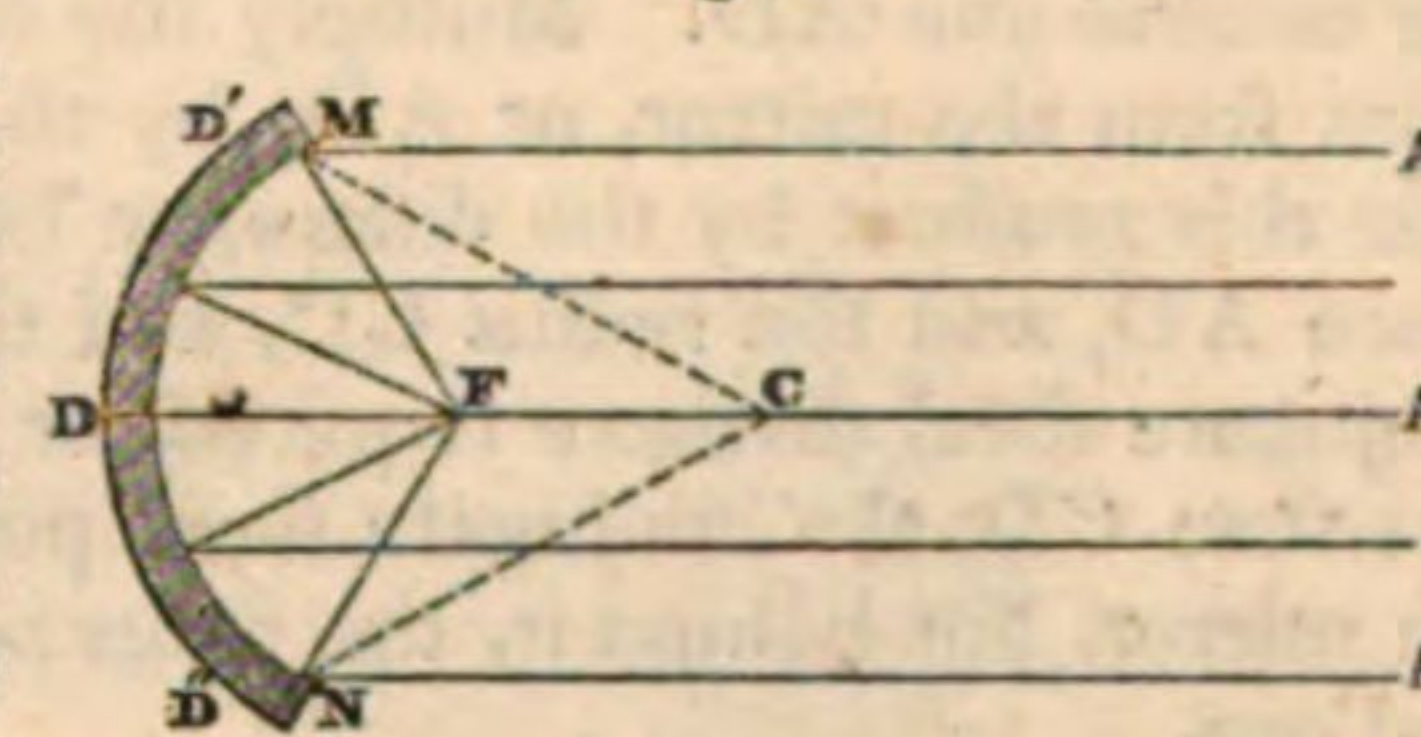
Fig. 6.



On the Reflexion of Rays from Concave Mirrors.

Reflexion of parallel rays. Let MN be a concave mirror whose centre of concavity is C, and let parallel rays AD, AD', A''D'', fall upon the mirror, the central ray AD passing through the centre C. From C draw the lines CD', CD''. Then since CD' is perpendicular

Fig. 7.



to the mirror at D', the ray AD' will be reflected in the same direction D'F, so that the angle of reflexion CD'F is equal to the angle of incidence AD'F. In like manner, the ray AD will be reflected to E, and the central ray AD will be reflected back to F also; all intermediate rays being likewise reflected to F.

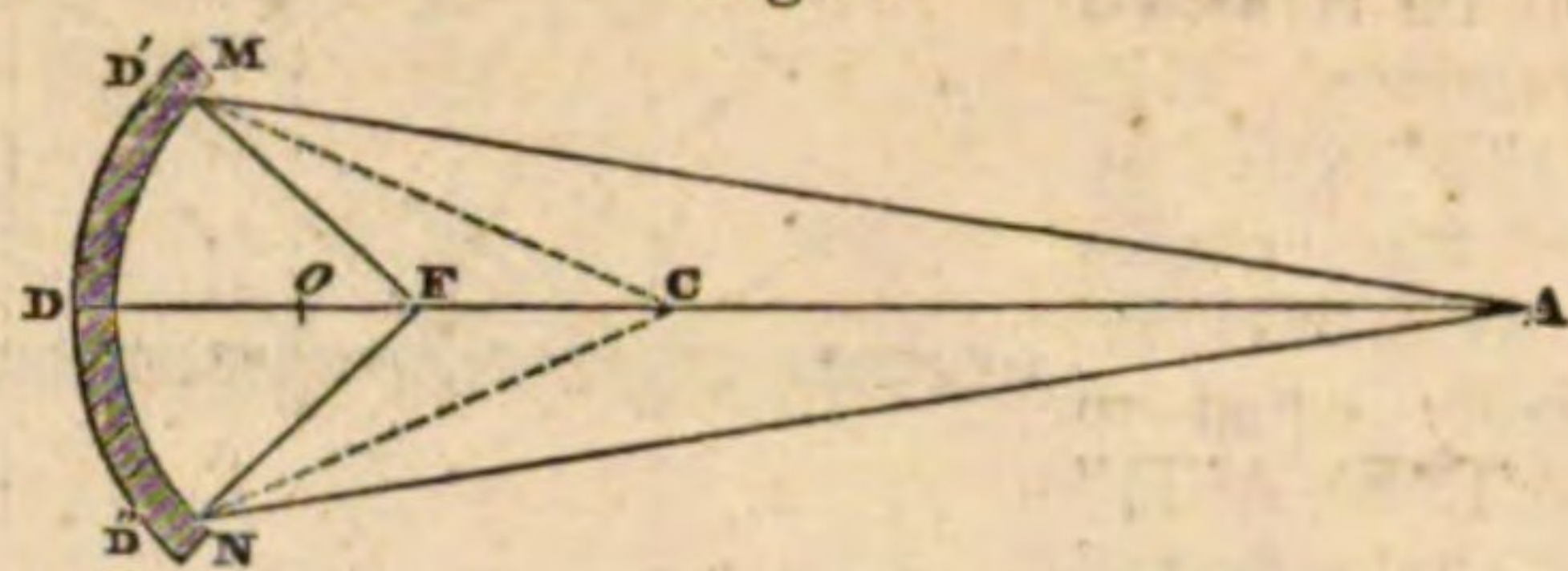
If the curvature of MN is not deep, and if the points D', D'' are taken near D, it will be found by making the angles of reflexion equal to the angles of incidence, that the rays all meet accurately at F, which is called the *focus* of the mirror for parallel rays, or its *principal focus*. This *focus* is in all mirrors exactly half-way between the centre C, and the surface of the mirror.

The point F derives its name of *focus* from its being the burning point of a mirror, or the point where the parallel rays, issuing from the sun are most condensed, and therefore occasion the most powerful heat.

Reflexion of diverging rays. Let AD, AD', AD'', be diverging rays issuing from A and falling upon the mirror MN, whose centre is C, and principal focus O. Then if we make the angles of reflexion equal to the angles of incidence, as in the last case, we shall find that the rays will be reflected to a point F, between the centre C of the mirror, and its principal focus O. If the radiant point A is removed from the mirror, and the rays fall on the same

Catoptrics. points of it, it is manifest that the incident rays will be removed farther from the perpendiculars CD' , CD'' ,

Fig. 8.



and consequently the reflected rays which meet at F, will also be removed farther from them. Hence F will approach to O, and when A is infinitely distant, and the rays parallel, F will coincide with O. But if A approaches to the mirror, the incident rays will approach to the perpendiculars, and as the reflected rays will do the same, their point of concurrence F will approach to C. When A reaches C, the focus F will also reach C, and the reflected ray will coincide with the incident ray.

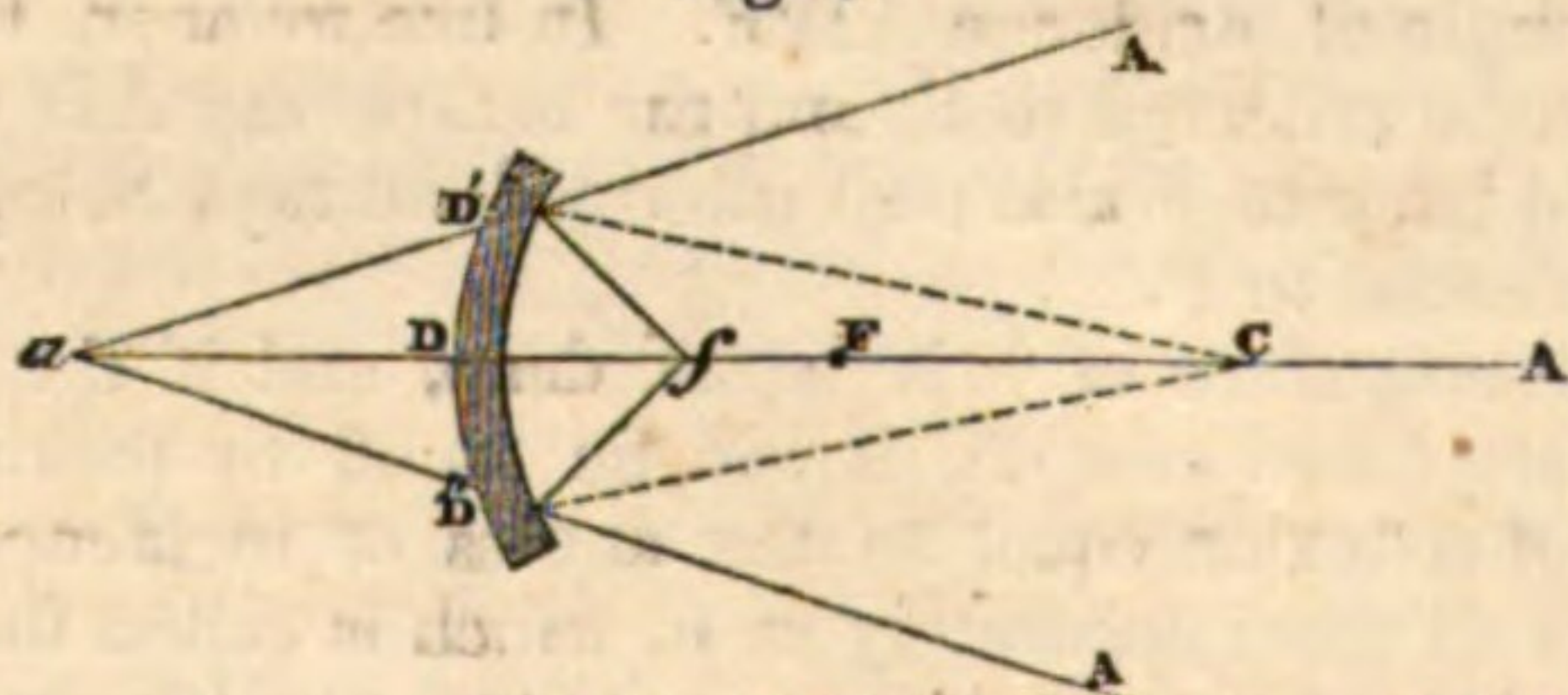
If A still advances towards the mirror, the incident rays will get within the perpendicular, and therefore the reflected rays will be without it, and their point of concurrence F will advance from C outwards, in proportion as the radiant point advances from C inwards. When A reaches the principal focus O, the reflected rays will be parallel, as seen in fig. 7, and when A comes still nearer the mirror, the reflected rays will diverge as if they proceeded from some point behind the mirror, this point being called the *virtual* or *imaginary focus* of such rays.

In all the preceding cases, the points A, from which the rays issue, and the point F where they are collected by reflection, are called *conjugate foci*, because if we make A the radiant point, F will be the focus, if we make F the radiant point, A will be the focus.

The conjugate foci of a concave mirror may be easily found by projection. The following rule will give the focus more accurately when the rays AD' , AD'' are not far from the central one AD. Multiply the distance of the radiant point from the mirror, or AD, by the radius CD, and divide this product by the difference between double the distance AD, and the radius CD, and the quotient will be the conjugate focal distance required, or FD. If twice AD is less than CD, the conjugate focal point will not be before the mirror, but behind it, the focus being in that case a virtual one.

Reflexion of converging rays. Let AD, AD' , AD'' be

Fig. 9.



rays converging to a point a behind the mirror MN, whose centre is C. Having drawn CD' and CD'' , make the angles of reflection $CD'f$, $CD''f$ respectively equal to the angles of incidence $AD'C$, $AD''C$; and $D'f$, $D''f$ will be the reflected rays having their focus at f , between the mirror and its principal focus F. If the point of convergence a of the rays, or the conjugate focus, approaches to the mirror, the other conjugate focus f will also approach to it, and if it recedes from the mirror, the focus f will also recede, reaching F when a is infinitely distant, in which case AD' , AD'' are parallel, as in Fig. 7. The following is the rule for finding the conjugate foci when one of them is given:

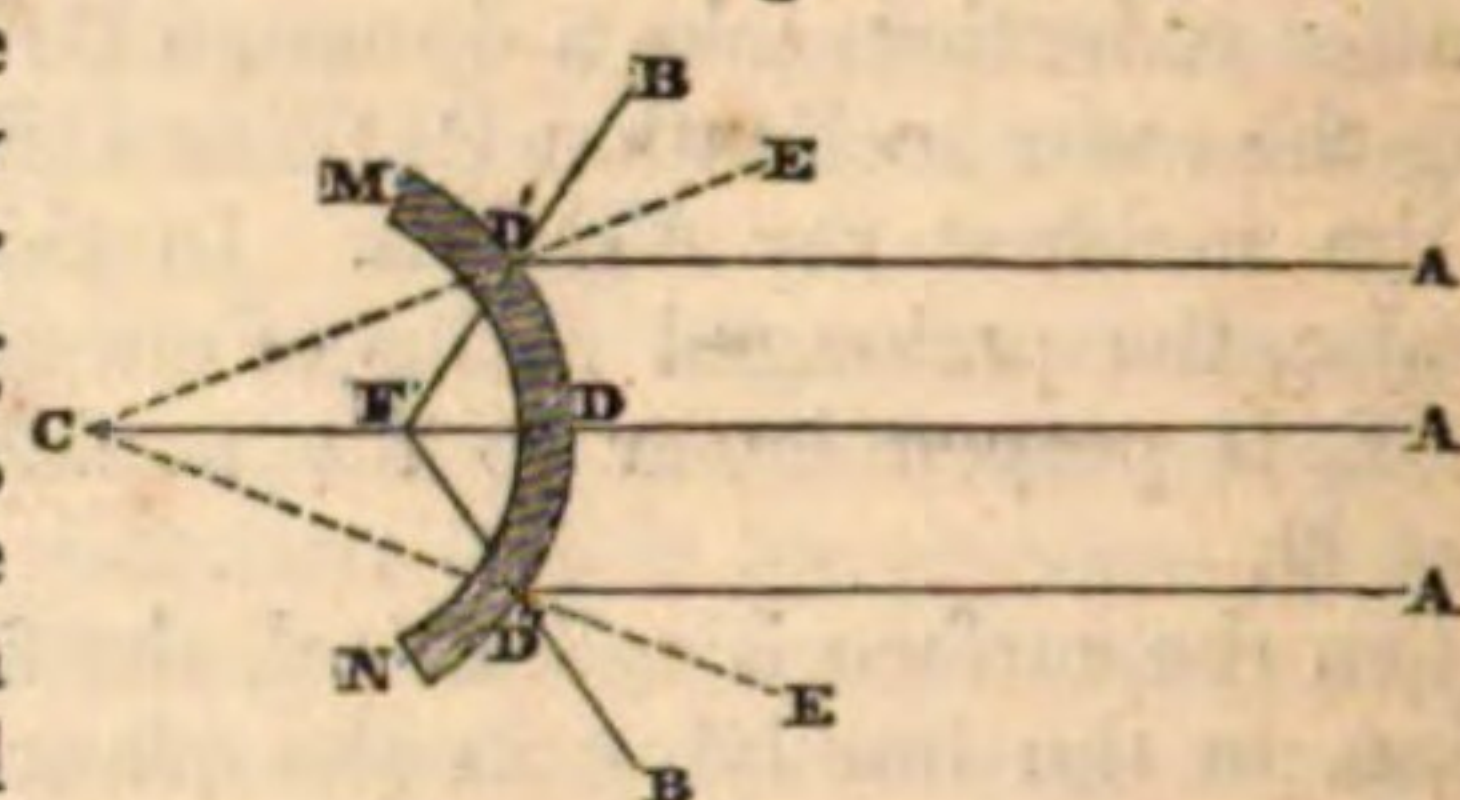
Multiply the distance of the point of convergence from the mirror, or aD by the radius of the mirror or CD, and divide this product by the sum of double the distance aD

and the radius CD, and the quotient will be the conjugate focal distance required, namely, fD , the focus f being in front of the mirror.

On the Reflexion of Rays from Convex Mirrors.

Reflexion of parallel rays. Let parallel rays AD, AD' , AD'' be incident upon the convex mirror MN, whose centre is C. Draw the perpendicular CE, CE passing through D' and D'', and making the angles of reflection EDB, $ED''B$ equal to the angles of incidence, $AD'E$, $AD''E$, the reflected rays will be $D'B$, $D''B$, whose virtual focus F is behind the mirror, and so situated that FD is equal to FC.

Fig. 10.



Reflexion of diverging rays. If we suppose the rays AAA to diverge from any point in the line or axis AD, they will recede from CE, CE, consequently the reflected rays $D'B$, $D''B$ will recede also; that is, will become more divergent, as if they came from a focus between F and D, the virtual focus approaching to D as the radiant point A approaches to D.

Reflexion of converging rays. In like manner, if the rays AAA widen at A, that is, converge to some point behind the mirror MN, they will approach to CE and CE, so that the reflected rays $D'B$, $D''B$ will also approach to CE, and consequently diverge less, or have their virtual focus between F and C. When the converging rays coincide with CE, CE, they will be reflected back in the direction in which they came, having C for their virtual focus. When the converging rays pass CE, the reflected rays will also pass to the opposite side, and converge less after reflexion, having their virtual focus beyond C. When they converge to F, the reflected rays will be parallel as in fig. 10, where we may suppose BD' , BD'' the incident, and $D'A$, $D''A$ the reflected rays. When the rays converge to a point between F and D, the reflected rays will converge to a point in the axis, and as the point of convergency of the incident rays approaches to it on the one side, the point of convergency of the reflected rays will approach to it on the other.

It would have been easy by the simplest elements of geometry, to have demonstrated the preceding truths; but the demonstration would have been rigorous only when the rays fell upon the mirror at points infinitely near D in the axis AD. By finding from projection the foci of rays of all kinds, and falling upon the mirror at all degrees of obliquity, the reader will acquire more substantial knowledge of the subject, than he can do either from geometrical or algebraic demonstrations. The same observation is applicable to the results obtained in the following section.

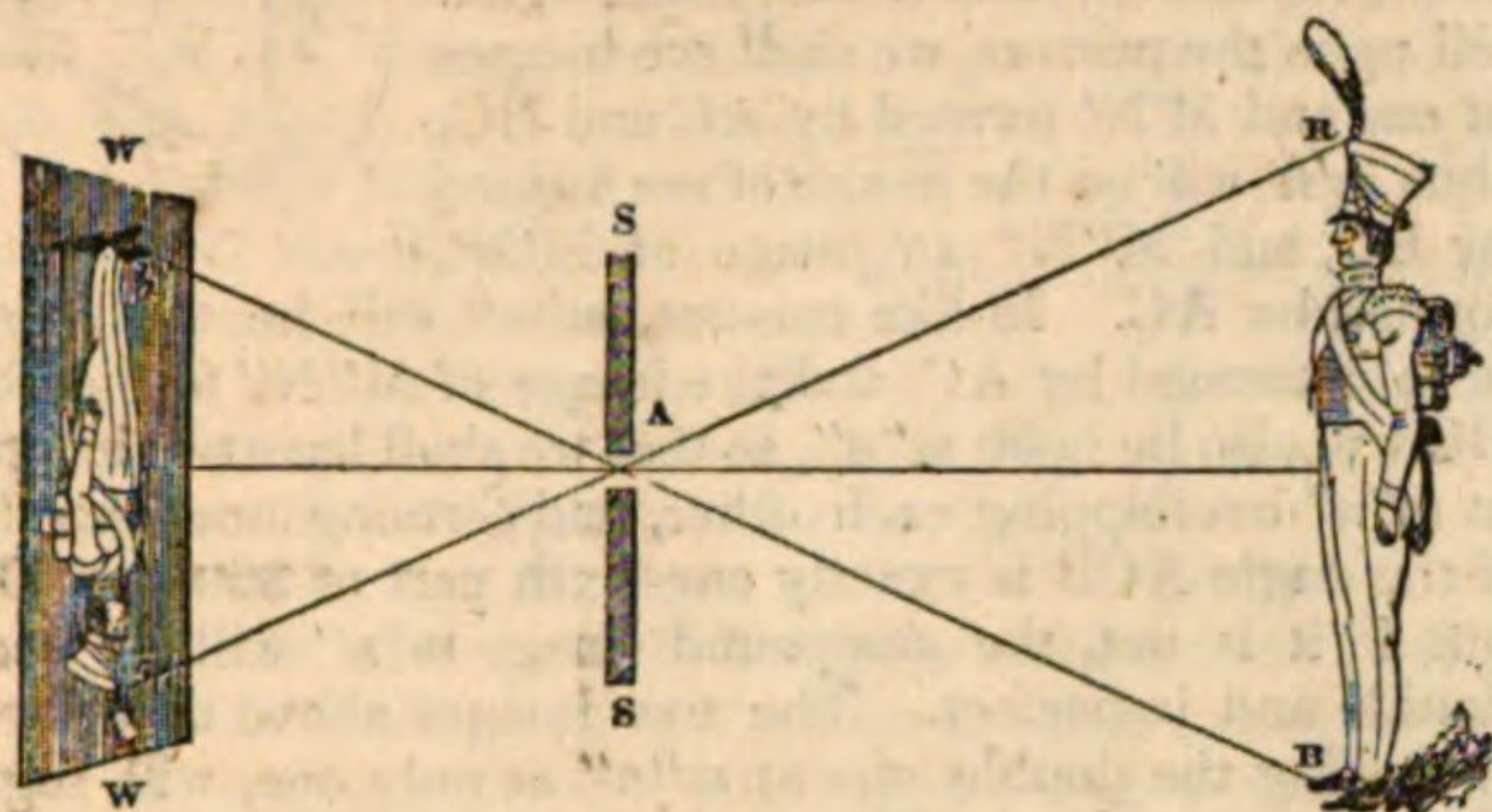
SECT. II.—On the Formation of Images by Plane, Concave, and Convex Mirrors.

Formation of Images by Apertures.—In optics an image is a luminous resemblance or picture of any object whatever, formed either on a white ground, such as a sheet of paper, or suspended in the air.

In order to understand how images are formed, let us suppose that a soldier is standing on the outside of an open window, with a *red coat* and *blue trousers*, strongly illuminated by the sun. The white wall opposite the window is illuminated by all the light which enters the window, the blue light of the sky, the green foliage, the red coat, and the blue trousers, so that it has no distinct colour, but a mixture of all these. If we close the shutters, so as to allow no

Catoptrics. light to fall upon the wall but the red light of the coat, and the blue light of the trowsers, it will be illuminated only by a mixture of red and blue light. But if we close all the shutters SS, and leave only a small hole A, about half an

Fig. 11.

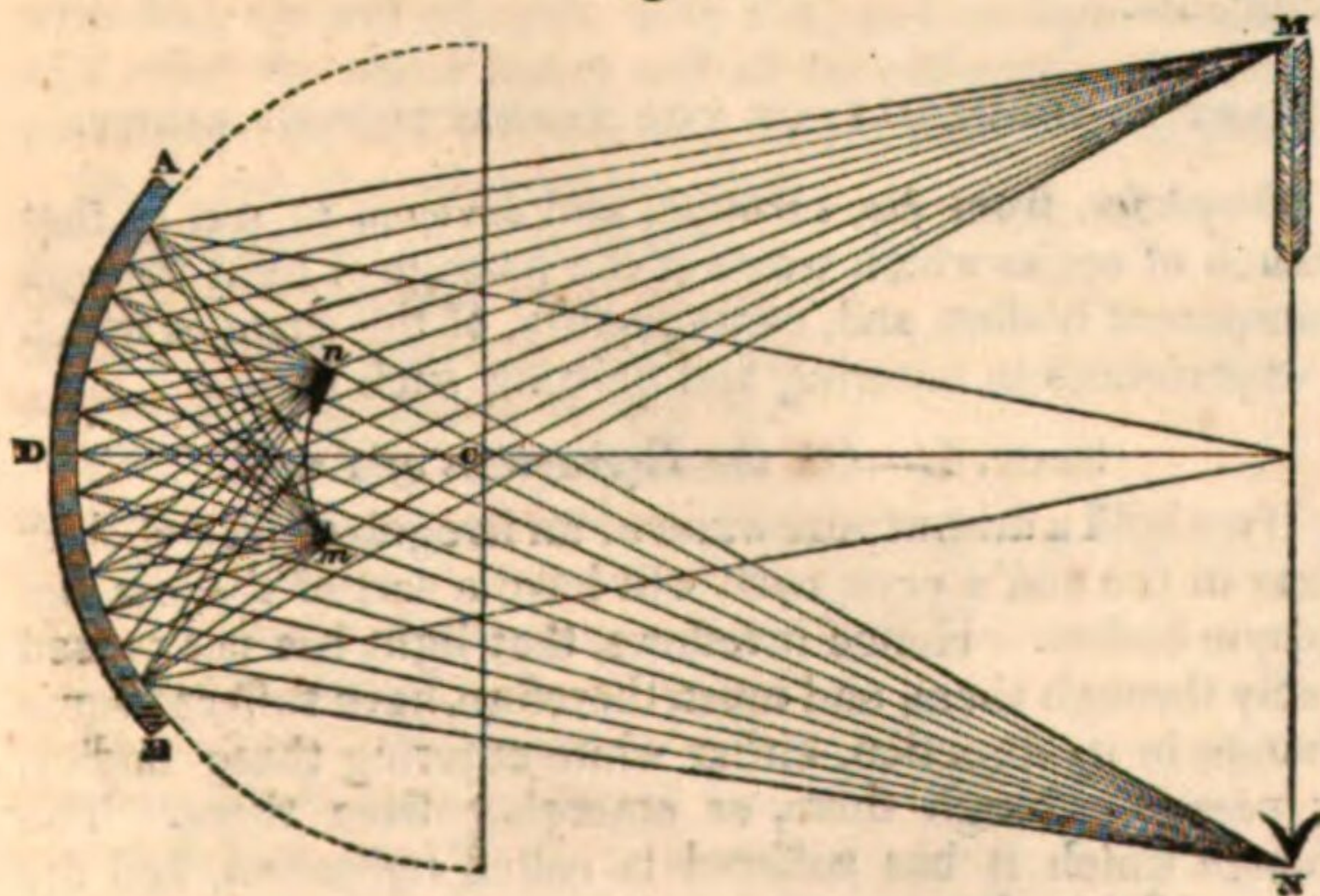


inch in diameter, then it is obvious that the red rays at and below R, passing through the hole A, will illuminate the opposite wall at and above *r* with red light, and the blue rays the opposite point at and below *b* with blue light; and that no red light can fall upon *b*, and no blue light upon *r*. Hence we shall have the red body of the soldier rudely shadowed out at and above *r*, and his blue legs at and below *b*, this small image being inverted, because the rays from the upper part of his body fall upon the lower part of the wall, and the rays from the lower part of his body upon the upper part of the wall. If we make the hole A smaller and smaller, the inverted image of the soldier will become more and more distinct, the colours will be better separated, and the picture may be made so distinct, that the features of the individual could be recognised. Now this separation of the various lights that at first fell upon the wall is effected solely by diminishing the aperture through which they pass, for if the aperture is exceedingly small, then as no two rays can proceed from the same point, they cannot fall upon or illuminate the same point, and hence each point of the object is represented on the wall by the colour of the light which it throws out.

As the coloured rays from the soldier are thrown off in all directions, an inverted image of that soldier may be formed in any part of space, by excluding all the other rays except those which pass through a small aperture. It is manifest, from a simple inspection of fig. 11, that the size of the inverted image will diminish not only with the distance of the aperture from the soldier, but also with the distance of the ground WW from the aperture.

Formation of Images by Concave Mirrors.—The effect of a concave mirror in forming an image is the same as that of an aperture; but it produces a finer effect, and acts upon a different principle.

Fig. 12.

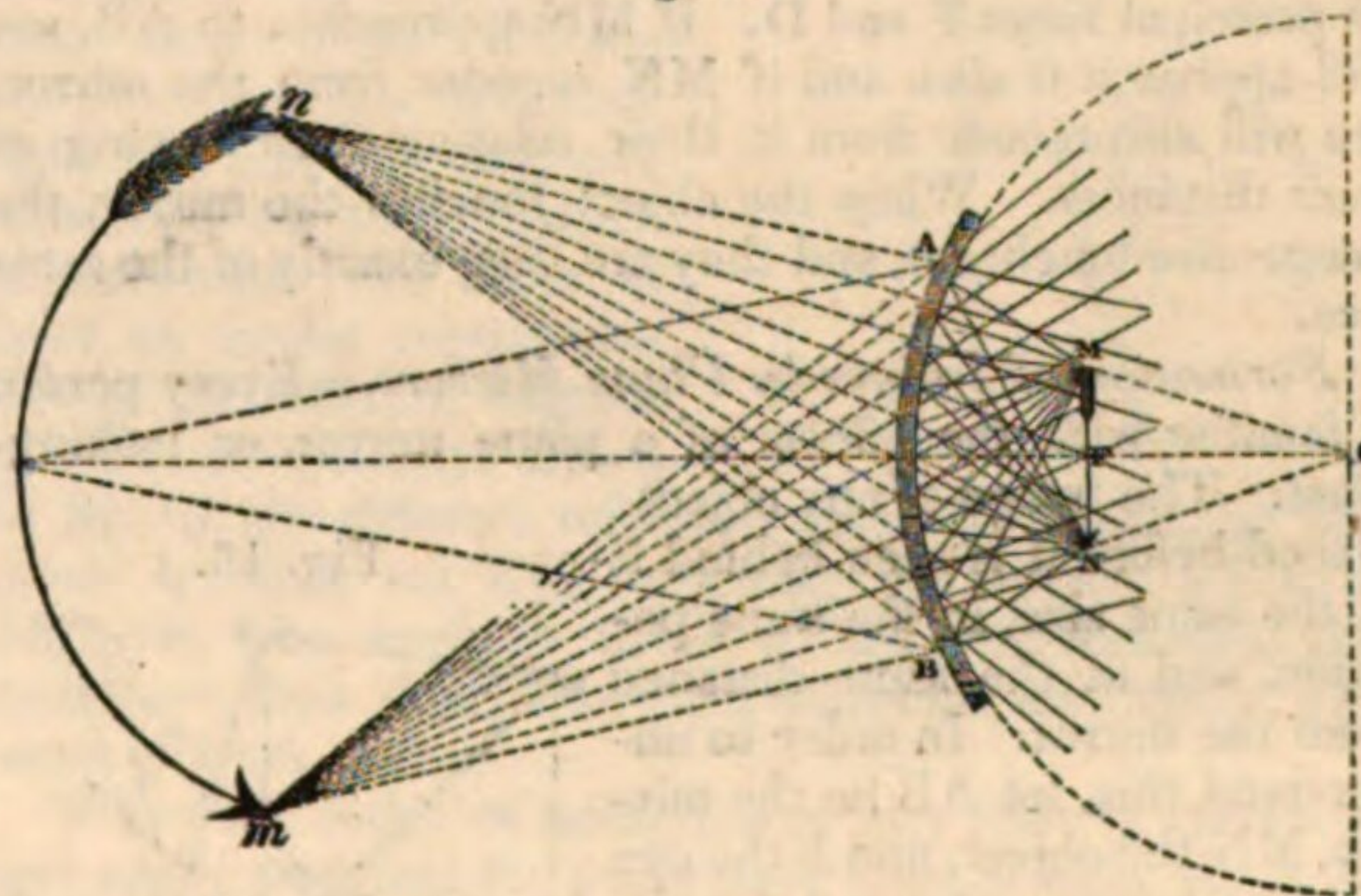


Let AB, fig. 12, be a concave mirror, C its centre, and MN an object placed before it. Of all the rays which flow from every part of this object in every direction, we shall consider only those which issue from its extremities MN. The rays from M radiate in every direction, but those which fall upon the mirror, namely, the pencil or cone MAB, are the only ones which require our notice. This pencil of diverging rays will have its focus at a point *m* farther from the mirror than its principal focus, and in like manner the pencil NAB will have its focus at some point *n*, pencils intermediate between M and N having their foci at points intermediate between *m* and *n*. These points may be found by projection, as already described, or by the rule given for diverging rays.

The image *mn* is obviously an inverted picture of the object MN, and its size is to that of the object as the distance of the image from the mirror is to the distance of the object from it, that is, as *nA* is to *NA*, as may be found from projection, or from an experimental measurement of the distance, when a mirror is actually used.

From the doctrine of reflected diverging rays it follows, and may be proved by projection, that as the object MN approaches to the mirror, the image *mn* will recede from the mirror, till the object and image meet one another at the centre C, where they will have the same size. If MN still moves towards the mirror within C, the image *mn* will move outwards beyond C, and the image will now be larger than the object. If the object comes to the place *mn*, and is of the same size as *mn*, the image of it will be formed at MN, and will have the same size as MN. If the object goes still nearer the mirror the image will go still farther off than MN, increasing in size. When the object reaches the principal focus half way between C and D, the image will be infinitely distant; and when the object goes still nearer the mirror, as in fig. 13, where it is placed at MN, between the principal focus

Fig. 13.



F and the mirror AB, the rays will diverge in front of the mirror, and form an inverted *virtual image*, *mn*, behind the mirror. As the image MN approaches the mirror, the virtual image *mn* also approaches to it.

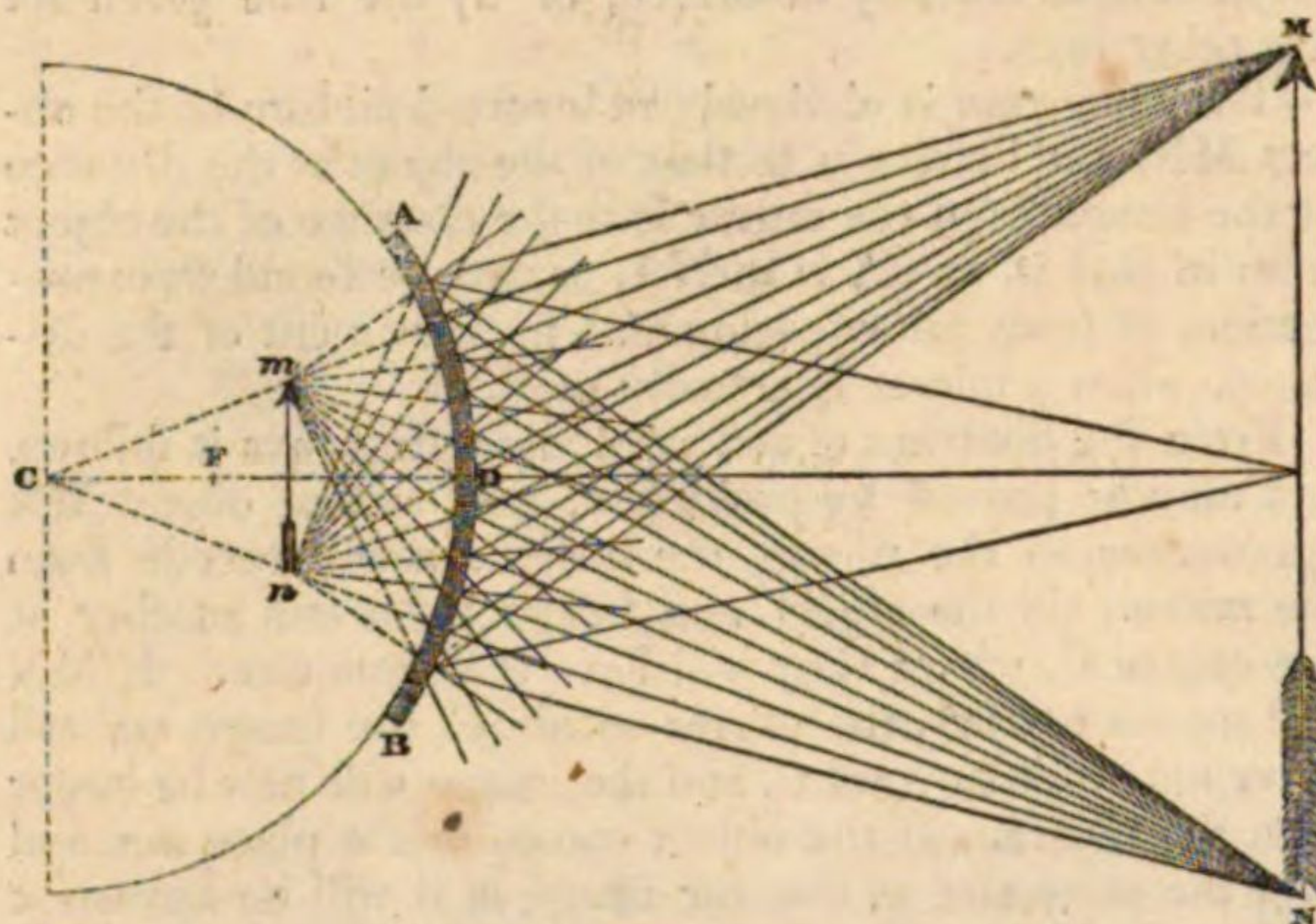
If we take a concave mirror of some size, and place before it any highly luminous or strongly illuminated object, such as a plaster of Paris cast, we may obtain an interesting experimental proof of the preceding results. When the image is formed in front of the mirror, it will appear suspended in the air, and the effect of this will be greatly heightened if it is received on a cloud of thin blue smoke raised from a chafing dish below the place of the image. By considering that as the object moves from MN to C, fig. 12, the image *mn* advances to C, we obtain an explanation of the celebrated experiment with the dagger mentioned by John Dee, in our history of the science, in which a person with a drawn dagger striking at the mirror is met by another person, viz., his own image, returning the stroke.

Catoptrics.

If the object MN is the sun, a small image of his disc will be formed at mn , in which are collected all the rays of light which fall upon the surface of the mirror. It will therefore have such a degree of heat as to melt even the hardest gems and metals. Such a mirror is called a burning mirror, from its effects.

Formation of Images by Convex Mirrors.—As convex mirrors often form a part of household furniture, we are more familiar with their properties. They always form *erect* images of objects, which appear at a distance behind them.

Fig. 14.



If AB is a convex mirror whose centre is C, and principal focus F, and MN an object placed before it, it is obvious, from our description of fig. 10, that the diverging pencils MAB, NBA, will diverge more after reflexion, as if they came from virtual foci mn behind the mirror, so that our eye receiving such diverging rays will see an erect image mn of the object MN placed behind the mirror, and between its principal focus F and D. If MN approaches to AB, mn will approach it also, and if MN recedes from the mirror, mn will also recede from it, their relative sizes varying as their distances. When the object touches the mirror, the image also touches it, and they are then exactly of the same size.

Formation of Images by Plane Mirrors.—Every person is familiar with the effects of a plane mirror, or looking-glass. The image of any object placed before it is seen behind it of the same size, in the same position, and at the same distance from the mirror. In order to understand this, let AB be the mirror, MN the object, and E the eye of the observer, situated in any given position. Rays from M and N fall upon every part of the mirror, but MC, MD are the only ones from M which can reach the eye E, as all the rest are reflected either above or below the eye E. In like manner, the rays NF, NG are the only ones from N which can enter the eye. The extremity M of the object will therefore be seen in the direction Em, and the concourse or virtual focus of the reflected rays will, as shewn in fig. 6, be at a point m , so situated, that if MAm is at right angles to the mirror, Am will be equal to AM. For the same reason, the point N will be seen at n , as far behind the mirror as N is before it; and it is obvious, from the parallelism of Mm and Nn, and the equality of the distance of M, m , and N, n from AB, that mn is equal to MN.

If two plane mirrors are inclined to each other, as AC, B, fig. 16, and an object MN placed between them, an

eye situated so as to receive the reflected rays, will see a series of images of MN all arranged symmetrically. Behind AC, for example, an image mn will be formed, and behind BC another image $M'N'$. But as the rays which form these images again fall upon the mirrors, we shall see images of mn and $M'N'$ formed by AC and BC, thus $m'n'$ will be the image of mn formed by BC, and $M''N''$ an image of $M'N'$, formed by AC. In like manner, $m''n''$ will be the image of $m'n'$ formed by AC, and the image of $M''N''$ formed by BC will also lie upon $m''n''$, so that we shall have two images at $m''n''$ overlapping each other, and forming one exactly, if the angle ACB is exactly one-sixth part of 360° , or 60° ; but if it is not, the compound image $m''n''$ will be seen double and imperfect. The five images above described, reckoning the double one at $m''n''$ as only one, will, together with the object MN, to which all the images are equal and similar, constitute a perfect equilateral triangle, so that if MN is a coloured and an irregular object, the symmetrical figure composed by it, and all its images, will be highly beautiful and agreeable to the eye. If MN, in place of being perpendicular to the mirror BC, had been inclined to it, no pair of images would have formed a straight line, as in the figure, and the combination would have been more beautiful. This is the principle of the *Kaleidoscope*, in as far as the multiplication and arrangement of the images is concerned; but this instrument has already been so admirably described by an eminent writer, in our article KALEIDOSCOPE, that we must refer the reader to it for farther information.

Formation of Images by Cylindrical Mirrors.—It is not easy, in a diagram, to represent the progress of rays in the formation of an image by a cylindrical mirror. As a cylinder is in one direction a plane mirror, in another a convex mirror, and in all others an elliptical one, the eccentricity of the ellipse passing through all degrees, from a circle to a straight line, different parts of a regular figure presented to such a mirror will appear of different sizes, and at different distances behind it. Part of the figure will have the same form and position as in a plane mirror, part as in a convex mirror, and the other parts of the image will have intermediate sizes and positions. Hence the image will be completely distorted. If the mirror is placed horizontally, the human face will appear of the right size from ear to ear, but contracted, as in a convex speculum, from brow to chin. Hence, if a distorted picture is properly drawn, and properly presented to the mirror, that is, if the cylinder is placed vertically before the picture, the image of the distorted picture will be rectified; the length between the ears will be contracted into the same proportional size as the shortness between the brow and the chin, and their shortness will remain unaffected. Such a distorted picture will be afterwards represented in the part of this article on Optical Instruments.

PART II. DIOPTRICS, OR THE REFRACTION OF LIGHT.

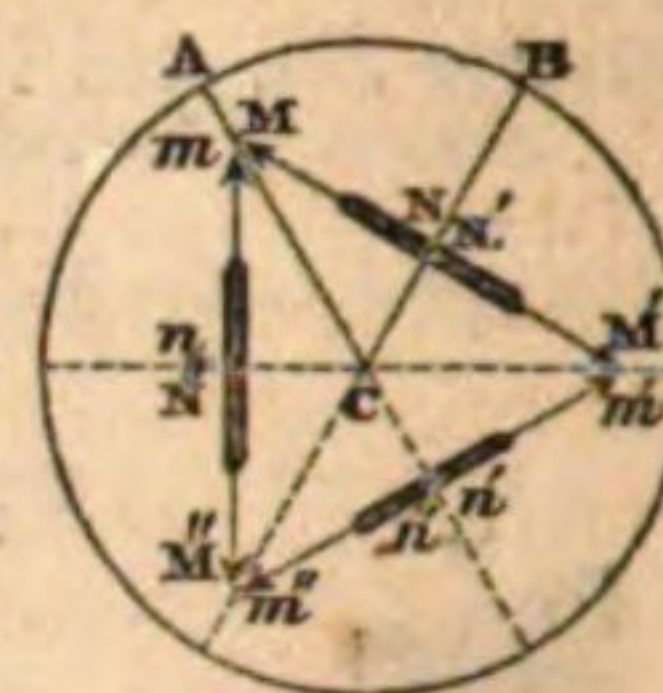
Dioptrics, from *δια*, through, and *ὀπτομαι*, to see, is that branch of optics which treats of the passage of light through transparent bodies, and, consequently, of the changes which it experiences in entering and quitting such bodies.

SECT. I.—On the Refraction of Light.

If we hold a drop of pure water or an irregular piece of clear glass in the sun's rays, each will have a sort of shadow like opaque bodies. Hence it follows, that light has not passed freely through them, and must, therefore, have suffered some change in its direction, either while entering these bodies, or passing through them, or emerging from them. The change which it has suffered is called *refraction*, and the nature of this change will be discovered by observing the

Dioptrics.

Fig. 16.



Dioptries. effects produced upon light by transparent bodies, whose surface is flat and regular.

For this purpose let AB, fig. 17, be the surface of *water* in a vessel, and RC a ray or pencil of light proceeding from a candle or from the sun, through a small hole, and falling upon the water at C. Part of this light will be *reflected* in the direction Cr, so that the angle rCP, is equal to RCP, PQ being a line perpendicular to the water at C; but the greater part of the light will enter the water at C, and in place of going straight on to e, it will be *bent* or refracted at C, or the ray Re will be *broken back* at C, and proceed in a straight line to E. Drawing a circle PAQB round C as a centre, and from the point E, where the refracted ray cuts it, drawing EK parallel to PQ, it was found by Snellius that CD was to CE or Ce as 3 to 4, and we have shewn in the history of optics, that if Rf and EF are drawn perpendicular to PQ, CD is to Ce as EF is to Rf. But Rf is the sine of the *angle of incidence* RCP, and EF is the sine of the angle ECQ, which is called the *angle of refraction*. Now, Snellius discovered by numerous experiments, that whatever was the magnitude of the angle of incidence RCP, the magnitude of the angle of refraction was such that CD was to Ce as 3 to 4, or in a constant ratio. Hence it follows, that the sines of the angles of incidence and refraction Rf and EF, are in the case of water in the constant ratio of 4 to 3.

Snellius in his manuscripts did not mention the *constant ratio of the sines*, but merely the *constant ratio of CD and Ce*, which is the same. The ratio of the sines was first mentioned by Descartes, but there can be no doubt that Snellius knew it perfectly, and that he preferred the use of the ratio of CD to Ce, for the following reason: When a luminous body is placed at E below water, and its light passes through a small aperture at C, it is found to be refracted or bent into the direction CR, so as to be seen by an eye at R, in the direction Re. It will, therefore, be seen, as it were, elevated from E to D. Hence Snellius preferred giving the law of this elevation, to any other law not connected with the phenomena.

As the incident ray RC approaches to the perpendicular PQ, the refracted ray CE approaches also to the perpendicular, and CD becomes less and less, and when RC coincides with PC, or when the ray is incident perpendicularly, the refracted ray CE will coincide with CQ, or the incident ray will suffer no refraction at C. When the angle of incidence RCP increases, and RC approaches to the surface of the water CB, the angle of refraction ECQ will also increase, the line CD will increase, and the refracted ray approach also to the surface CA, and when RC coincides with BC, Ce will coincide with CA, and no light whatever will enter the water but it will all be reflected. When Ce coincides with CA, CD will be 3, and D will coincide with K.

Such are the phenomena and law of refraction when light passes from a rare medium such as *air*, into a dense medium such as *water*, the ray being always *refracted from the perpendicular*, according to the fixed law already described. Let us now suppose, that the ray of light passes from a dense medium, such as water placed above AB, into a rare medium, such as air placed below AB, and let PQ be a perpendicular to the surface of the water at C. It is found by experiment that the ray

Fig. 17.

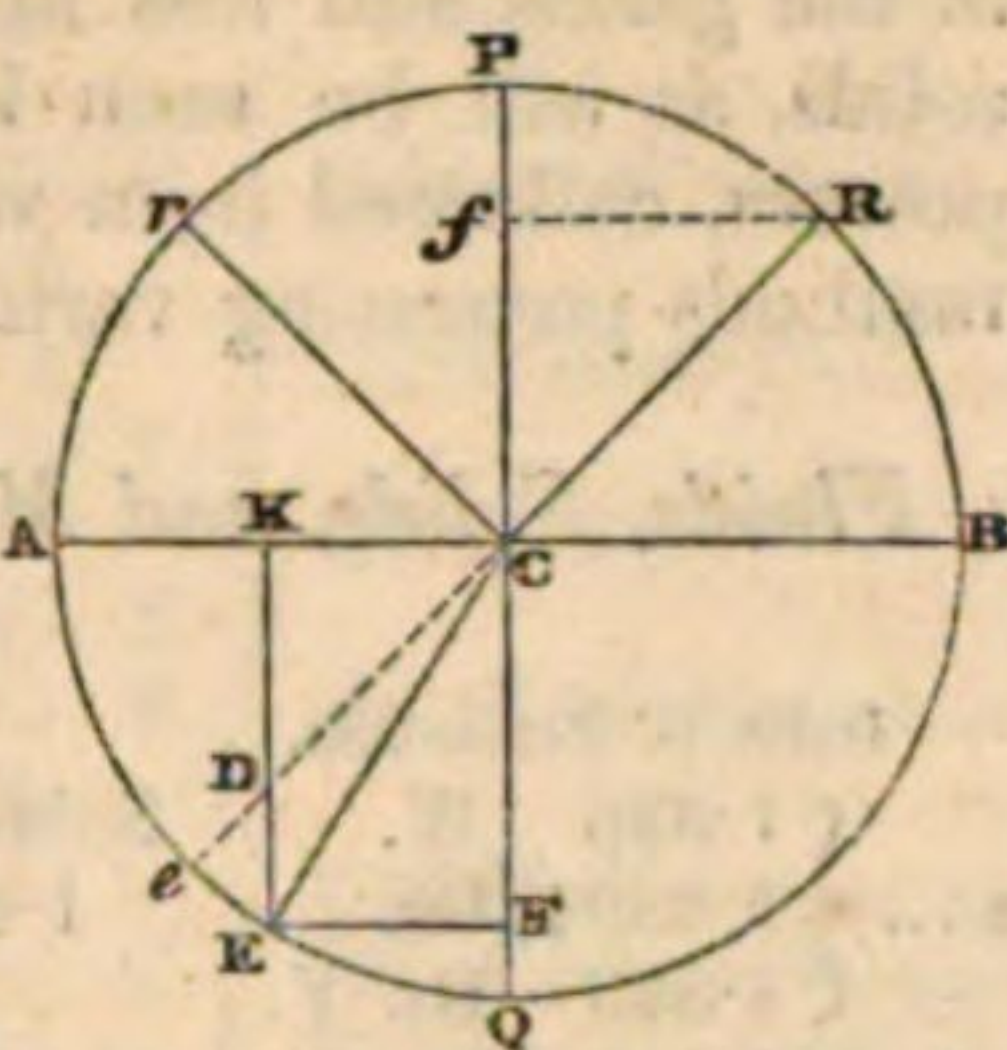
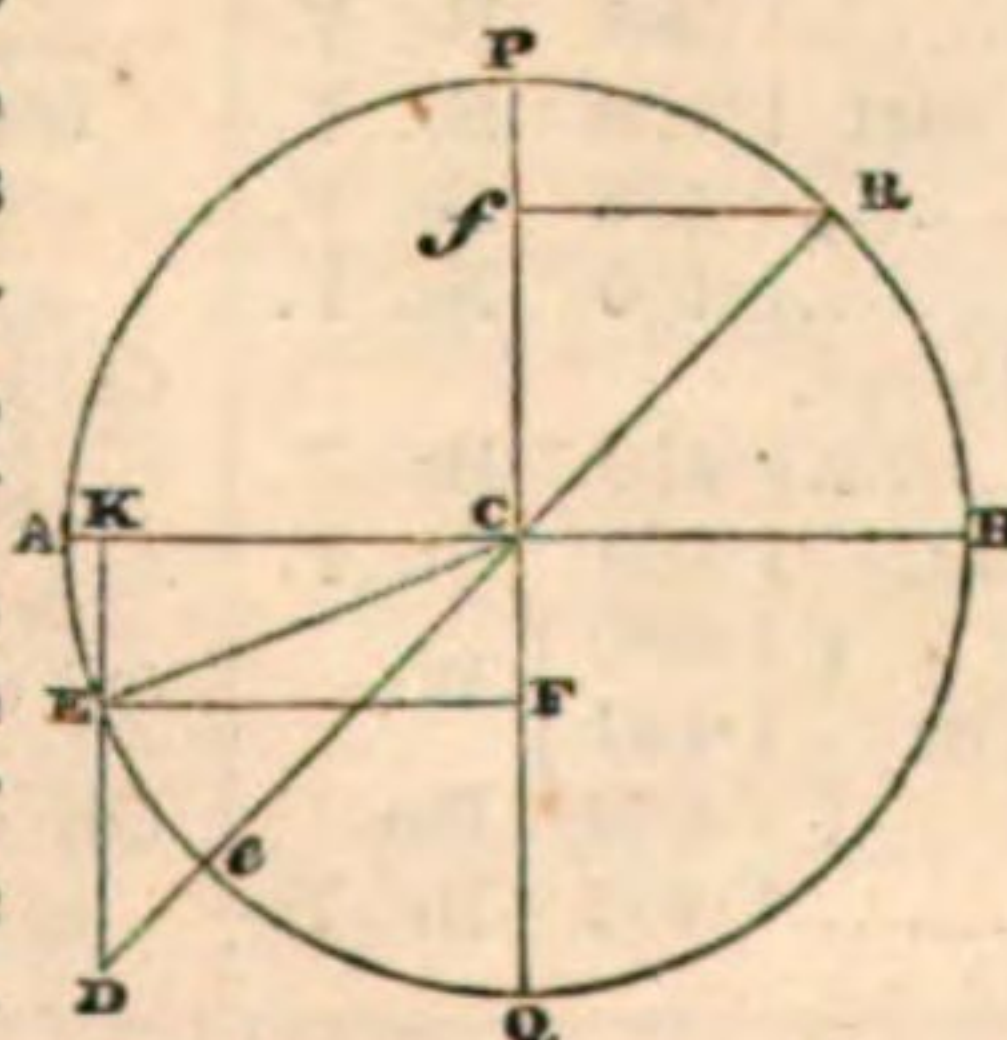


Fig. 18.



neither goes straight on to e, nor is refracted towards the perpendicular as before, but is refracted from the perpendicular into the direction CE, so that if the line KED is drawn through E, parallel to PQ, and cutting the original direction of the ray Re prolonged, in the point D, CD will be to CE or Ce as 4 to 3, and in a constant ratio, or Rf the sine of the angle of incidence will be to EF the sine of the angle of refraction in the constant ratio of 4 to 3. When the ray RC coincides with PC, so that the angle of incidence is nothing, the angle of refraction will also be nothing, and the refracted ray CE will coincide with CQ, the incident ray having gone straight on without experiencing any refraction; but when the angle of incidence increases, and RC approaches towards BC, the refracted ray CE will approach to CA, which it will reach long before R reaches B. When CE reaches CA, the ray RC will no longer emerge from the water into the air, but will suffer what is called *total reflexion* at C, and at every angle of incidence beyond that at which this total reflexion commences, the light will continue to be totally reflected till RC coincides with RB.

If we repeat all the above experiments with *plate* or *crown glass*, in place of *water*, we shall find the very same phenomena reproduced, with this difference only, that the constant ratio of CD to Ce, or of the sines Rf to EF, in place of being as 3 to 4 in one case, (see fig. 17,) and 4 to 3 in the other (see fig. 18,) will be as 2 to 3, and as 3 to 2, or in the case of water the ratio will be as 1 to 1.333, and in glass as 1 to 1.500. The number 1.333 is called the *index of refraction* for water, and 1.500 the *index of refraction* for glass. In like manner it is found that the index of refraction for *tabasheer* is 1.111, being less than that for water; for flint glass 1.600, for diamond 2.500, and for chromate of lead about 3.00. Hence it follows, that bodies refract light in different degrees, measured by their indices of refraction. In order to have an ocular representation of the different degrees of refraction, we have drawn in fig. 19, the different refracted rays, corresponding to a given incident ray RC, supposing the surface AB to be first *air*, (the medium above it being a vacuum), then *tabasheer*, then *flint glass*, then *diamond*, and, lastly, *chromate of lead*.

When the index of refraction of any body is known, we can easily ascertain the progress of a ray of light which falls upon such a body, and its direction after quitting the body. The following example of this we shall give for plate glass.

Let AB be the surface of a piece of plate glass whose index or ratio of refraction is as 2 to 3, or as 1 to 1.50, and let a ray of light RC fall upon it at C. Prolong RC to e, and upon a scale of equal parts take in the compasses CD, equal to 10 of these parts, and Ce equal to 15, or CD equal to 2, and Ce to 3 parts. Upon C as a centre with the radius Ce describe the semicircle AeB, and through D draw KDE, perpendicular to AB, and meeting the semicircle in E, join CE, and CE will be the refracted ray. When the ray passes from a denser to a rarer medium, as in fig. 18, Ce is made equal to 10, and CD to 15, and DK being drawn perpendicular to AB, and a line

Fig. 19.

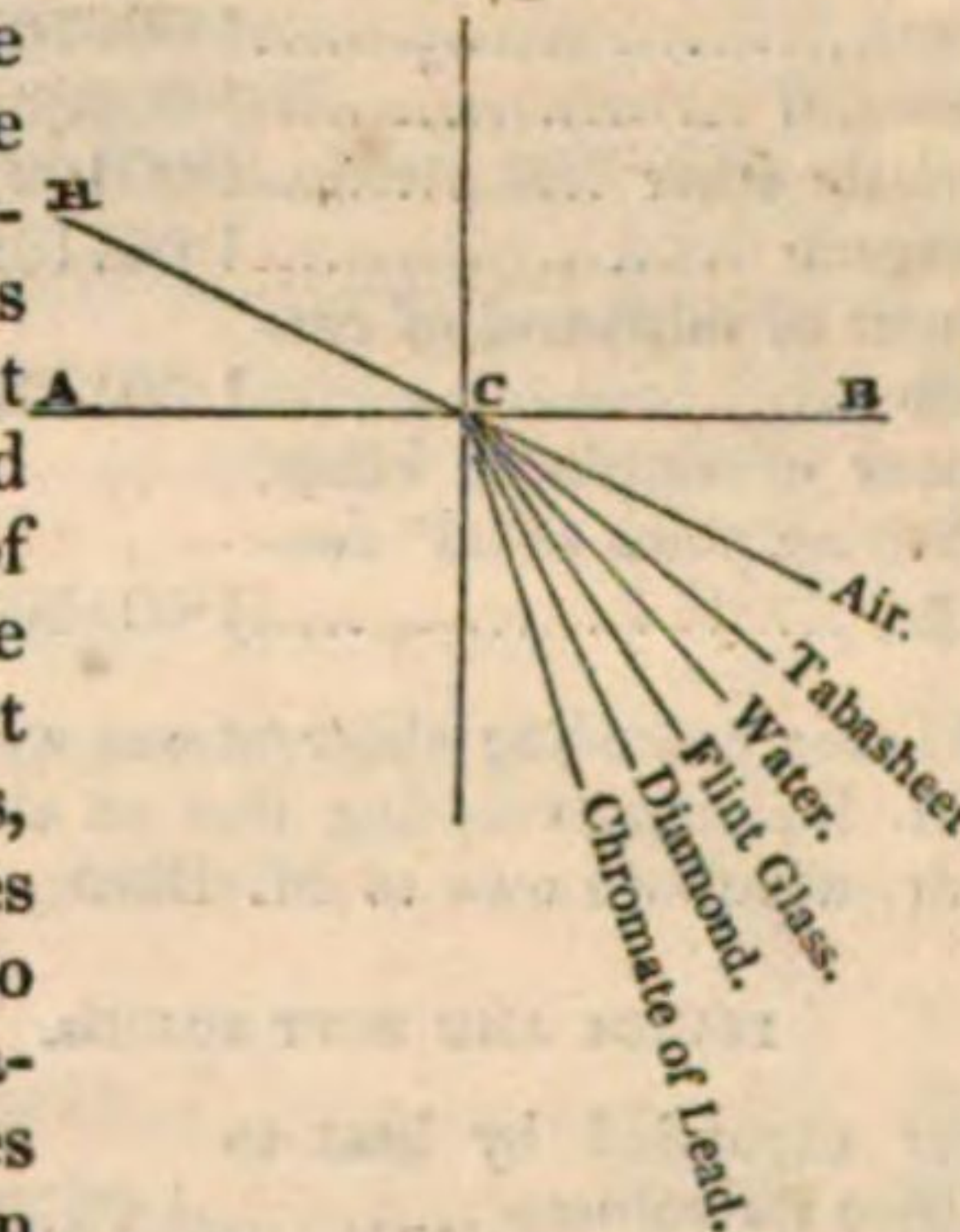
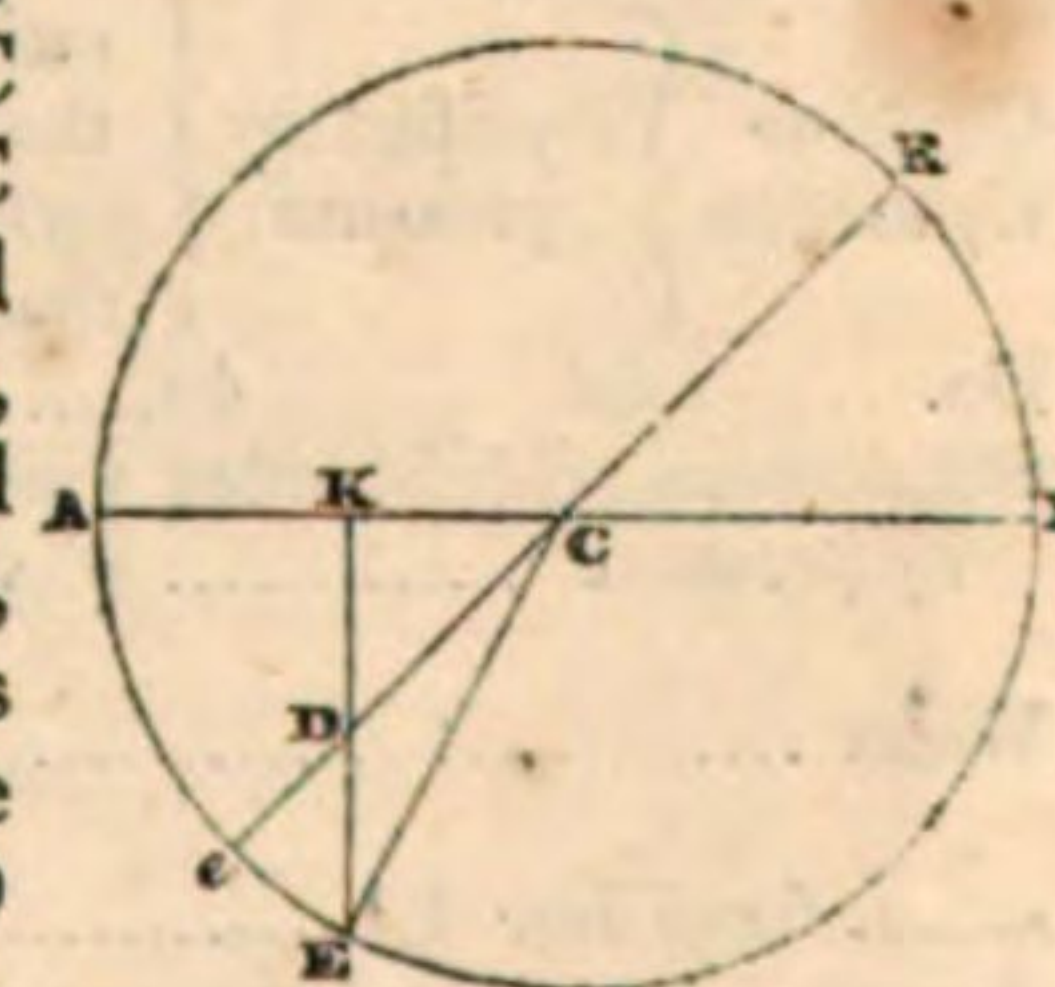


Fig. 20.



Dioptries. drawn from C to the point E, where DK cuts the circle, CE will be the refracted ray. This method, which is obviously much more simple and elegant than when we use the sines of the angles, is, so far as we know, new, and we shall use it in future for determining the place of the refracted ray. It is obvious, that when D and K coincide with A, fig. 18, DK becomes a tangent to the circle at A, and the light suffers total reflexion.

If the preceding experiments are repeated with various Dioptries, solids and fluids, it will be found, that the same law of refraction takes place with all of them, the index of refraction varying more or less in each, the refractive power being least in the gases, and less in fluids, generally speaking, than in solids, as will be seen in the following table of refractive powers, collected from various authors, and determined by methods possessing various degrees of accuracy.

Table of the Refractive Powers of Gases, Fluids, Solids, and Metallic Bodies.

Index of Refraction.		Index of Refraction.		Index of Refraction.	
A vacuum .....1.0000		Vitreous humour of eye ... { 1.336 W. 1.3394 Br. 1.340 Br. Y.		Solution of potash, sp. gr. 1.416; fixed line E.....1.40563Fr.	
GASES. ¹		lamb .....1.345 Br. Y.		Nitric acid, sp. gr. 1.48... { 1.410 Br. Y. 1.410 W. 1.412 C.	
Hydrogen .....1.000138		pigeon .....1.353 Br. Y.		Hydrate of soda, melted by heat .....1.411 Br. Y.	
Oxygen .....1.000272		Saliva .....1.339 Br. Y.		Hydrophosphoric acid, do....1.423 Br. Y.	
Atmospheric air .....1.000294		Expectorated mucus .....1.339 Br. Y.		Phosphoric acid fluid .....1.426 Br.	
Azote.....1.000300		Salt water .....1.343 Br.		Yolk of a fresh egg .....1.428 Br. Y.	
Nitrous gas .....1.000303		Vinegar, distilled { 1.344 Eul. 1.372 H. 1.347 Br. Y.		Sulphuric acid, sp. gr. 1.7 { 1.429 N. 1.430 He. 1.435 W. 1.440 Br.	
Carbonic oxide .....1.000340		Acetic acid .....1.396 Br.		Oil of rhue { 1.433 Br. 1.449 Br. Y.	
Ammonia .....1.000385		Jelly fish (medusa æquorea)...1.345 Br.		Phosphorous acid.....1.437 Br. Y.	
Carburetted hydrogen .....1.000443		White of an egg .....1.351 Eul.		Hydrophosphoric acid, cold { 1.441 Br. Y. 1.442 Br.	
Carbonic acid.....1.000449		a hen's do { 1.359 Br. Y. 1.361 Br.		Spermaceti, melted..... { 1.446 W. 1.444 Br. Y.	
Muriatic acid.....1.000449		Port wine.....1.351 Br. Y.		Oil of wax.....1.452 C.	
Hydrocyanic acid .....1.000451		Human blood.....1.354 Br. Y.		Oil of wormwood.....1.453 Br.	
Nitrous oxide.....1.000503		Saturated solution of alum and water.....1.356 He.		boiling .....1.4416 M.	
Sulphuretted hydrogen .....1.000644		Oil of boxwood .....1.356 Br. Y.		Bees' wax, melted .....1.453 Br. Y.	
Sulphurous acid.....1.000665		Ether { 1.358 W. 1.374 Br. Y.		melting.....1.4503 M.	
Olefiant gas .....1.000678		Albumen .....1.36 W.		boiling .....1.542 W.	
Chlorine.....1.000779		Brandy .....1.360 Br. Y.		Oil of camomile..... { 1.457 Br. 1.476 Br. Y.	
Protophosphuretted hydro- gen.....1.000789		Rum .....1.360 Br. Y.		Oil of lavender..... { 1.457 Br. 1.467 W.	
Cyanogen .....1.000834		Oil of ambergris { 1.368 Br. 1.379 Br. Y.		Tallow, melted.....1.460 W.	
Muriatic ether .....1.001095		Alcohol.....1.37 W.		White wax, melted .....1.462 Br. Y.	
Phosgene .....1.001159		sp. gr. 0.866..... { 1.37 N. 1.371 C. 1.372 He.		Oil of poppy..... { 1.467 Br. 1.483 Br. Y.	
Vapour of sulphuret of car- bon.....1.001500		rectified spirits... { 1.374 Br. 1.377 Br. Y.		Oil of peppermint..... { 1.468 W. 1.473 Br. Y.	
Vapour of sulphuric ether, (boiling point at 35° cen- tig.) .....1.001530		Saturated solution of salt.....1.375 C.		Oil of rosemary { 1.469 Br. 1.472 Br. Y.	
All the preceding observations were made by M. Dulong, excepting that on atmosphe- ric air, which we owe to M. Biot.		Muriatic acid .....1.376 Br.		Oil of almonds..... { 1.470 Br. 1.473 Br. Y.	
FLUIDS AND SOFT SOLIDS.		sp. gr. 1.134 { 1.392 He. 1.391 Br. Y.		Oil of turpentine, rectified ...1.470 W.	
Ether expanded by heat to thrice its volume .....1.0570 Br.		strong.....1.401 Br.		Spirit of turpentine, sp. gr. 0.876.....1.471 N.	
Volatile new fluid discovered by Sir D. Brewster in ca- vities in topaz .....1.1311 Br.		highly concen- trated.....1.4098 Bi.		Oil of turpentine..... { 1.475 Br. 1.476 Br. Y. 1.482 C.	
Volatile new fluid discovered by Sir D. Brewster in ame- thyst, at 83½° Fahr.....1.2106 Br.		Oil of wine .....1.379 Br.		common { 1.476 W. 1.486 He.	
Second new fluid discovered by Sir D. Brewster in topaz 1.2047 Br.		Sweet spirit of nitre.....1.384 He.		sp. gr. 0.885, fixed line E.....1.47835Fr.	
Nitrous oxide, liquified { much less } F.		Cornea of a lamb .....1.386		{ 1.467 N. 1.469 W.	
by pressure..... { than water }		Malic acid.....1.395 Br.		Oil of olives, sp. gr. 0.913 { 1.470 Br. 1.4705 He.	
Muriatic acid { nearly { much less } F.		Pus .....1.404 Br. Y.		{ 1.476 Br. Y. 1.477 Br.	
gas, do..... { equal { than water }		Nitrous acid..... { 1.396 Br. 1.404 Br. Y.		Oil of bergamot { 1.471 Br. 1.473 Br. Y.	
Carbonic acid { equal { than water }		Nitric acid.....1.406 Br.		Oil of birch, distilled from { 1.470 Br. Y. 1.471 Br.	
gas, do..... { rather less } F.		Crystalline lens of man, outer coat .....1.3767 Br.		spermaceti..... { 1.471 Br.	
Chlorine { liquified by { than water } F.		middle coat 1.3786 Br.			
Cyanogen { pressure { perhaps less } F.		centre .....1.3970 Br.			
Do. do. do.....1.316 Br.		lamb's eye, outer coat .....1.386 Br. Y.			
Sulphurous acid, liquified { same as } F.		middle coat 1.428 Br. Y.			
by pressure { water }		centre .....1.436 Br. Y.			
Water .....1.336 { N. W. Br.		pigeon .....1.406 Br. Y.			
fixed line E ² .....1.33585Fr.		haddock's eye, outer coat.....1.410 Br. Y.			
Aqueous humour of the eye 1.3366 Br.		centre 1.439 Br. Y.			
of haddock 1.341 Br. Y.		of the ox { 1.380 } W. 1.447 } Eu. 1.463 } Eu.			
		Juice of orange peel.....1.403 Br. Y.			

¹ Taken when the temperature was 32° Fahr., and the barometer at 29.922.

² The fixed line E is given in this Table for several substances, as it is in the green space, and nearly the mean ray.

Dioptries.	Index of Refraction.	Index of Refraction.	Index of Refraction.	Dioptries.	
Oil of beech ?	1.471 Br.	Oil of cinnamon	1.508 Br.	Yolk of an egg, dry	1.500 Br. Y.
Oil of juniper	1.473 Br.	Oil of mace	1.519 Br. Y.	Triple oxalate of chromium	
Butter, cold	1.474 Br. Y.		1.522 Br. Y.	and potash, least	1.506 Br.
Palm oil	1.480 W.	Oil of sassafras	1.532 Br.	greatest	1.605 Br.
Oil of rape seed	1.475 Br. Y.		1.536 W.	Glass plate, English	1.500 W
	1.475 Br.		1.544 Eu.	French	1.50
Naphtha	1.475 Br. Y.	Balsam of Gilead	1.529 Br. Y.	English, ext.	1.5133 He.
Essence of lemon	1.476 W.		1.514 Eu.	red ray	1.514 Bosc.
Oil of dill seed	1.477 Br.	Oil of cloves	1.535 W.	Dutch	1.517 W.
	1.487 Br. Y.		1.539 Br. Y.	crown	1.525
Oil of thyme	1.477 Br.	Oil of cashew nut	1.536 Br. Y.	crown, prism Dollond,	
	1.486 Br. Y.		1.519 Eu.	ext. red ray	1.526 He.
Oil of cajeput	1.478 Br. Y.	Oil of anise seed	1.536 Br. Y.	crown, prism Dollond,	1.5109 Br.
Naples soap	1.483 Br.		1.601 Br.	crown, Fraunhofer, No.	
Oil of mace, melted	1.479 Br. Y.	Petroleum	1.544 Br. Y.	13, sp. gr. 2.535, fixed line	
Oil of spearmint	1.481 Br. Y.	Oil of tobacco	1.547 Br.	E,	1.5314 Fr.
	1.481 Br.	Balsam of styrax	1.584 Br.	do., No. 9, fixed line,	
Oil of lemon	1.490 Br. Y.		1.534 Eu.	sp. gr. 2.535	1.5330 Fr.
	1.481 Br.	Oil of cinnamon	1.589 Br. Y.	Fraunhofer, sp. gr.	
Oil of pennyroyal	1.489 Br. Y.		1.604 Br. Y.	2.756, fixed line E,	1.5631 Fr.
	1.482 Br.		1.632	bottle	1.582 Br.
Linseed oil, sp. gr. 0.932	1.485 Br. Y.	Balsam of Peru, mean	1.600 Br.	Starch, dry	1.504 Br. Y.
	1.482 N.	Essential oil of bitter almonds	1.603 Br.	Stilbite	1.508 Br.
	1.485 W.		1.626 Br. Y.	Gum scammony	1.510 Br. Y.
Oil of savine	1.487 Br. Y.	Oil of cassia	1.631 Br.	Gum Arabic	1.512 Br.
Oil of juniper	1.482 Br.		1.641 Br.	not quite dry	1.513 Br. Y.
	1.482		1.647 Br.		1.514 W.
Train oil	1.491	Sulphuret of carbon	1.678	Human cuticle	1.514 W.
Oil of wormwood	1.483 Br. Y.	Muriate of antimony, vari-			1.517 W.
	1.485	able, about	1.8 W.	Nitre, least index	1.335 Br.
Castor oil	1.489	SOLIDS.		greatest	1.514 Br.
	1.485	Tabasheer from Vellore	1.1111 Br.	sp. gr. 1.9	1.524 N.
Florence oil	1.490 Br.	Nagpore	1.1454 Br.	Dantzic vitriol, sulphate iron	1.515 N.
Oil of fenugreek	1.487 Br.	ditto	1.1503 Br.	Nadelstein from Faroe	1.5153 Br.
	1.488 Br. Y.	whitest kind	1.1825 Br.	Mesotype, least	1.516
Oil of hyssop	1.487 Br.		1.3085 Br.	greatest	1.522 Br.
	1.495 Br. Y.	Ice	1.310 W.	Sulphate of zinc, ordin. refr.	1.517
Windsor soap	1.487 Br. Y.		1.344 Br.	Myrrh gum	1.517 Br. Y.
	1.490 He.	Cryolite	1.349 Br.	Tartaric acid, least	1.526 Br.
Nut oil, perhaps impure	1.491 Br. Y.	Carbonate of potash, lowest		greatest	1.575
	1.507 Br.	refr.	1.379 Br.	Wavellite	1.52 W.
Tallow, cold	1.49 W.	Gluten of wheat, dried	1.426 Br. Y.	Gum dragon, (tragacanth),	1.520 Br.
	1.492 Br. Y.		1.433 W.	1.66	W.
Oil of caraway seeds	1.483 Br. Y.	Fluor spar	1.436 Br.	Glass—borax, 1; silex, 2	1.528 Br.
	1.491 Br.	Alum	1.457 W.		1.521 W.
Oil of marjoram	1.490 Br. Y.	sp. gr. 1.714	1.458 W.	Gum or shell lac	1.525 Br. Y.
	1.491 Br.	Sulphate of magnesia	1.465 Br.		1.528 W.
Oil of nutmeg	1.491 Br. Y.		1.488 Br.	Caoutchouc	1.524 W.
	1.497 W.	Borax, sp. gr. 1.7149	1.467 N. C.		1.534 Br.
Oil of angelica	1.491 Br. Y.		1.475 Br.	Selenite, sulphate of lime	1.525 W.
	1.493 Br.	Fluellite	1.47 W.	greatest	
Bees' wax	1.507 Br. Y.	Gum Arabic, sp. gr. 1.375	1.467 N.	refraction	1.536 Br.
cold	1.492	Gmelinite	1.474 Br.	A selenites, sp. gr. 2.252	1.488 N.
white wax, cold	1.535 W.	Opal, partly hydrophanous	1.479	Citric acid	1.527 Br.
Balsam of sulphur	1.494 Br. Y.	Arsenate of soda, least	1.479 Ha.	Leucite	1.527 Br.
	1.497 Br.	greatest	1.481	Crystalline of ox and fish,	
Honey	1.495 Br. Y.	Sulphate of ammonia and		dried	1.530 W.
Grass oil	1.496 Br.	magnesia	1.483		1.531 W.
Treacle	1.500 W.	Camphor	1.487 W.	Pitch	1.581 Br. Y.
Oil of beech nut	1.500		1.496 Br. Y.		1.586 Br.
	1.500 Br.	sp. gr. 1.0996	1.500 C. N.	Sulphate of copper, least	1.531
Oil of rhodium	1.503 Br. Y.	Obsidian	1.488 Br.	refraction	1.552
	1.503	Iceland spar, ext.	1.488 W.	Olibanum gum	1.532 Br. Y.
Spermaceti, cold	1.535 W.	ditto	1.4833 M.		1.544 Br.
	1.503 Br. Y.	fixed line E, do.	1.4887 Ru.	Glass of phosphorus, phos-	
Oil of pimento	1.510 Br.	ord.	1.657 W.	phoric acid fused	1.532
	1.507 Br.	ord.	1.6543 M.	Solid phosphoric acid	1.544 Br.
Oil of amber	1.505 W.	fixed line E, ord	1.6636 Ru.	Glass of borax, fused borax	1.532
	1.507 Br. Y.	ord.	1.667 N.	Manna	1.533 Br. Y.
Bird lime	1.506	ord.	1.665 Br.	Arragonite, ext. index	1.5348 M.
Oil of sweet fennel seeds	1.506 Br.	Sulphate of iron, greatest	1.494 Br.	ord.	1.6931 M.
	1.507 Br. Y.	Sulphate of potash	1.475 W.	1st axis of elasticity	1.5326 Ru.
Balsam of capivi	1.507 W.		1.509 Br.	2d ditto	1.6863 Ru.
	1.515 Br. Y.	Rochelle salt, mean, green	1.4985 He.	3d ditto	1.6908 Ru.
Canada balsam	1.528 W.	red	1.4929 He.	Arsenate of potash	1.535 W.
	1.532 Br. Y.	tartrate of potash			
	1.549 Br.	and soda	1.515 Br.		

¹ Dr. Wollaston informed us that he had mistaken Dragon's Blood for Gum Dragon.

Dioptries.	Index of Refraction.	Index of Refraction.	Index of Refraction.	Dioptries.	
Fahlunite	1.535 Br.	Prussiate of potash.....	1.586 Br.	Glass, tinged red with gold...1.715	
Elemi gum	1.535 W.	Anhydrite, ord.....	1.5772 Bi.	deep red.....1.729	
.....	1.547 Br. Y.	ext.....	1.6219 Bi.	Euchroite, least	1.709 Br.
.....	1.550 Br. Y.	Gum ammoniac.....	1.585	Nitrate of silver, least	1.729
Mastic gum	1.535 W.	Hyposulphite of lime, least...1.583	He.	greatest.....1.788	
.....	1.549 Br. Y.	greatest 1.628		Hyposulphite of soda and	
.....	1.568 Br.	Emerald	1.585 Br.	silver, least	1.735 He.
Anime gum	1.535 W.	Benzoic gum, mean	1.591 W.	greatest 1.785	He.
.....	1.546 Br. Y.	Tortoise shell	1.591 Br.	Axinite.....	1.735
.....	1.535 W.	.....	1.596 W.	Nitrate of lead	1.758 Br.
Copal gum.....	1.549 Br.	Guaiacum gum	1.600 Br. Y.	Cinnamon stone	1.759
.....	1.553 Br. Y.	.....	1.619 Br.	Chrysoberyl	1.760
Sugar, white.....	1.536 W.	Beryl.....	1.598 Br.	.....	1.756 He.
.....	1.541 Br. Y.	Balsam of Tolu.....	1.60 W.	Spinelle.....	1.761 Br.
..... melted	1.548 Br. Y.	 mean.....	1.618 Br.	.....	1.812 W.
Felspar	1.536 Br.	Siliceo-carbonate of zinc and		Felspar, greatest refr.....	1.764 Br.
Mellite, least.....	1.538 Br.	iron, least	1.6005 Br.	Sapphire, white	1.768 W.
greatest.....	1.556 Br.	greatest 1.8477	Br.	blue.....	1.794 Br.
Juniper gum.....	1.538 Br.	Hopeite, ord.....	1.601	Rubellite.....	1.768 He.
.....	1.541 Br. Y.	Glass, ruby red.....	1.601	.....	1.779 Br.
Carbonate of barytes, least...1.540	Br.	Meionite.....	1.606 Br.	Ruby.....	1.779 Br.
Boxwood	1.542 W.	Iron sinter.....	1.606	Zircon, orange coloured	1.782 Br.
Colophony.....	1.543 W.	Glass, purple coloured.....	1.608	Glass lead, (flint).....	1.787 Ze.
Apophyllite.....	1.5431 He.	Resin of jalap.....	1.608 Br. Y.	Pyrope	1.792 Br.
Carbonate of strontian, least 1.543		Hyposulphite of strontian,		Labrador hornblende.....	1.80 He.
greatest 1.700	Br.	least	1.608 He.	Arsenic.....	1.84 W.
Dichroite, Iolite	1.544	greatest 1.651		Carbonate of lead, least.....	1.813 Br.
Rock salt, sp. gr. 2.143....	1.545 N.	Topaz, colourless.....	1.6102 Bi.	greatest...1.084	Br.
.....	1.557 Br.	1st axis of elasticity...1.6145	Ru.	Garnet	1.815 Br.
Chio turpentine, mean.....	1.551 Br.	2d ditto ditto.....	1.6167 Ru.	Borate of lead, fused, extreme	
Sagapenum gum	1.545	3d ditto ditto.....	1.6241 Ru.	red ray	1.866 He.
Turpentine	1.545 Br. Y.	bluish, from Cairngorm 1.624	Br.	Sulphate of lead	1.925 Br.
Burgundy pitch, mean.....	1.558	Brazil, ord.....	1.6323 Bi.	Withamite, least	1.931 Br.
Gum thus, mean.....	1.550 Br.	ext.....	1.6401 Bi.	greatest.....	1.960 Br.
Rock crystal, ord.....	1.547 W.	blue Aberdeen	1.636	Glass, lead 2—sand 1	1.987 W.
ext.....	1.562 Br.	yellow.....	1.638 Br.	Zircon	1.95 W.
ditto	1.563 W.	red	1.652	least refraction.....	1.961 Br.
Amethyst	1.562 W.	Siliceo-carbonate of zinc from		greatest ditto.....	2.015 Br.
Quartz, ord. ray	1.5484 M.	Aachen, least	1.6173 Br.	.....	1.958 Haüy.
ext.....	1.5582 M.	greatest 1.6395	Br.	Sulphur, native.....	2.008 Br. Y.
ord., line E.....	1.5471 R.	from Bohemia, least 1.600		.....	2.04 W.
ext. ditto	1.5563 R.	greatest 1.848		.....	2.115 Br.
Amber.....	1.547 W.	Glass, bright green,	1.615 Br.	 melted.....	2.148 Br.
sp. gr. 1.04.....	1.556 N.	Castor,	1.623 Br.	Calomel	1.970
Resin, mean.....	1.554 Br.	Sulphate of barytes, ord.....	1.6352 M.	Tungstate of lime, least	1.970 Br.
Glue, nearly hard.....	1.553 Br. Y.	ext.....	1.6468 M.	greatest...2.129	
Chalcedony	1.553 Br.	ord.....	1.6201 Bi.	Glass, lead 3—flint 1	2.028 Ze.
Comptonite	1.553 Br.	ord. yel-		Scaly oxide of iron.....	2.1 Y.
Opium.....	1.559 Br. Y.	low, green rays.....	1.6460 He.	.....	1.889 N.
.....	1.57 W.	specimen, red rays.....	1.6459 He.	Glass of antimony.....	1.980 W.
Hyposulphate of lime, mean		 ditto,		.....	2.15 Po. ¹
red ray.....	1.561 He.	yellow, green rays.....	1.6491	.....	2.216 Br.
mean green	1.566 He.	 a pseu-		Silicate of lead, atom to	
Dragon's blood	1.562 Br. Y.	do-topazus, sp. gr. 4.27...1.643	N.	atom, extreme red.....	2.123 He.
Horn.....	1.565 Br.	do. do...1.646	W.	Phosphorus.....	2.125 Br. Y.
.....	1.58 W.	Muriate of ammonia.....	1.625 Br.	.....	2.224 Br.
Wernerite, ext.....	1.563	Aloes.....	1.634 Br. Y.	Blende.....	2.260 Br.
ord.....	1.594	Glass, opal coloured.....	1.635 Br.	Nitrite of lead, biaxial, in six-	
Baryto-calcite, least.....	1.565 Br.	Euclase, ord.....	1.6429 Bi.	sided prisms, ord. ray.....	2.322 He.
greatest.....	1.701	ext.....	1.6630 Bi.	Diamond, sp. gr. 3.4.....	2.439 N.
Glass, pink coloured.....	1.570	Sulphate of strontian.....	1.649	.....	2.470 Br.
Assafoetida	1.575 Br. Y.	Glass, hyacinth red	1.647	 brown coloured...	2.487 Br.
.....	1.576 Br.	Mother-of-pearl	1.653	.....	2.775 Rodw.
Flint glass, var. specimens		Spargelstein	1.657	Plumbago	from 2.04
.....	1.583 W.	Epidote, least.....	1.661 Br.	to 2.44	W.
.....	1.584 He.	greatest.....	1.703	Chromate of lead	2.479
.....	1.594 Bosc.	Tourmaline	1.668	another kind,	
extreme red.....	1.596 Br.	Chrysolite, least	1.660	least refraction	2.503
.....	1.601 He.	greatest	1.685	another kind, do. 2.508	Br.
.....	1.604 Br. Bosc.	Chloruret of sulphur.....	1.67	another kind,	
Fraunhofer, No. 3,		Nitrate of bismuth, least.....	1.67 He.	greatest refraction.....	2.974
line E	1.6145 Fr.	greatest 1.89		 another kind, do. 2.926	
No. 30, line E, 1.6374	Fr.	Glass, orange coloured.....	1.695 Br.	Octohedrite.....	2.500
No. 23, ditto 1.6405	Fr.	Boracite.....	1.701	Realgar, artificial.....	2.549 Br.
No. 13, ditto 1.6420	Fr.			Red silver ore	2.564

In the preceding Table, the letter *N* affixed to any index of refraction, indicates that the observation was made by Newton; *H*, Hauksbee; *E*, Euler; *M*, Malus; *C*, Cavallo's table; *Ru*, Rudberg; *Bi*, Biot; *Po*, Potter; *Ze*, Zeiher; *Bosc*, Boscovich; *Fr*, Fraunhofer; *He*, Sir John Herschel; *F*, Mr. Faraday; *Hai*, Haidinger; *W*, Wollaston; *Br*, Sir David Brewster; and *Br. Y*, by Dr. Young, who calculated the indices from Sir David Brewster's observations.

¹ Deduced from its polarising angle, which was 65°.

is proportional directly to the square of the cosine of their maximum angle of refraction, and inversely to their specific gravity; that is, calling R the absolute refractive power, m the index of refraction, and D the density of the body, we

shall have $R = \frac{m^2 - 1}{D}$, a formula by which the following

table of absolute refractive powers has been computed. The numbers marked *Dulong*, were, we believe, computed by Sir John Herschel, from the refractive indices given by Dulong in the preceding table.

Index of Refraction.		Index of Refraction.		Index of Refraction.			
Tabasheer	0·0976	} Brewster.	Calcareous spar.....	0·6424	Malus.		
Cryolite	0·2742				0·6536	Newton.	
Fluor spar.....	0·3426				0·6440	Brewster.	
Oxygen	0·3799	Dulong.	Nitre	0·7079	} Newton.		
Sulphate of barytes... {	0·3829	Dulong.		0·6477			
	0·3979	Newton.	Muriate of soda.....	0·7100	Brewster.		
Sulphurous acid gas....	0·4455	} Dulong.	Alum	0·6570	Newton.		
Nitrous gas	0·4491			Nitric acid.....	0·6676	Brewster.	
	0·4528	} Biot.	Borax	0·6716	Newton.		
Air.....	0·4530			Hydrocyanic acid	0·7366	Dulong.	
	0·5208		Newton.	Ruby	0·7389	Brewster.	
Carbonic acid gas.....	0·4537	} Dulong.	Sulphate of iron.....	0·7551	Newton.		
Azote.....	0·4734			Muriatic ether vapour...	0·7552	Dulong.	
Chlorine.....	0·4813			Brazilian topaz	0·7586	Brewster.	
Glass of antimony.....	0·4864	Newton.	Rain water	0·7845	Newton.		
Nitrous oxide.....	0·5078	} Dulong.	Flint glass, mean.....	0·7986	Brewster.		
Phosgen.....	0·5188			Cyanogen	0·8021	} Dulong.	
Selenite	0·5386	Newton.	Sulphuretted hydrogen..	0·8419			
Carbonic oxide	0·5387	Dulong.	Gum Arabic.....	0·8574	Newton.		
Quartz	0·5415	Malus.	Sulphuret of carbon va-	} Dulong.			
Rock crystal	0·5450	} Newton.	pour		0·8743		
Common glass.....	0·5436			Sulphuric ether vapour..	0·9138	Dulong.	
Muriatic acid gas.....	0·5514	Dulong.	Protosulphuretted hydro-	}			
Sulphuric acid.....	0·6124	Newton.	gen.....		0·9680		
					Ammonia	1·0032	} Dulong.
					Alcohol, rectified.....	1·0121	
					Carbonate of potash	1·0227	} Brewster.
					Chromate of lead	1·0436	
					Olefiant gas	1·0654	Dulong.
					Muriate of ammonia.....	1·0788	Brewster.
					Carburetted hydrogen....	1·2204	Dulong.
					Camphor	1·2551	} Newton.
					Oil of olives.....	1·2607	
					Oil of linseed.....	1·2819	
					Spirit of turpentine.....	1·3222	} Malus.
					Bees' wax	1·3308	
					Amber	1·3654	Newton.
					Octohedrite	1·3816	} Brewster.
					Bi-sulphuret of carbon..	1·4294	
					Diamond	1·4566	Newton.
					Oil of cinnamon.....	1·4944	} Brewster.
					Oil of cassia ¹	1·6184	
					Realgar.....	1·6666	
					Ambergris.....	1·7000	} Dulong.
					Sulphur.....	2·2000	
					Phosphorus	2·8857	} Dulong.
					Hydrogen	3·0953	

SECT. II.—*On the Refraction of Rays by bodies with plane and spherical surfaces.*

The names of *prisms* and *lenses* have been given to those transparent bodies which are most useful in optical experiments, and in the construction of optical instruments. Sections of these different refracting bodies are shewn in the annexed diagram.

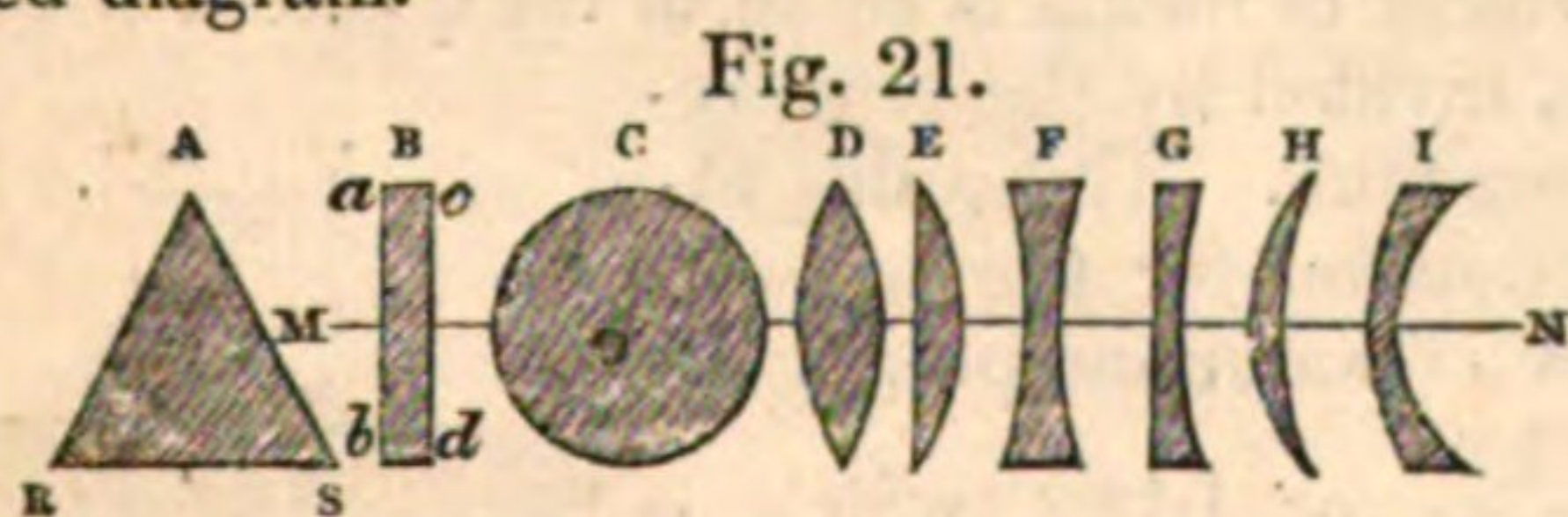
2. A *plane lens*, B, is a lens, the centre of whose surfaces are infinitely distant. Its sides are therefore parallel like a piece of plane glass.

4. A *double convex lens*, D, has two convex spherical surfaces, whose centres are on opposite sides of the lens. It is said to be *equally convex* when the radii of its two surfaces are equal; and *unequally convex* when the radii are unequal.

6. A *double concave lens*, shewn at F, is a solid bounded by two concave spherical surfaces. It is *equally concave* when its surfaces have the same radius, and *unequally concave* when they have different radii.

8. A *meniscus lens*, H, has one of its surfaces *concave* and the other *convex*, the two surfaces meeting if continued. The convexity predominates, and it acts as a convex lens.

9. A *concavo-convex lens*, I, differs from the meniscus only in the circumstance that the two surfaces do not meet if continued. Hence the concavity predominates, and the lens acts as a concave one.



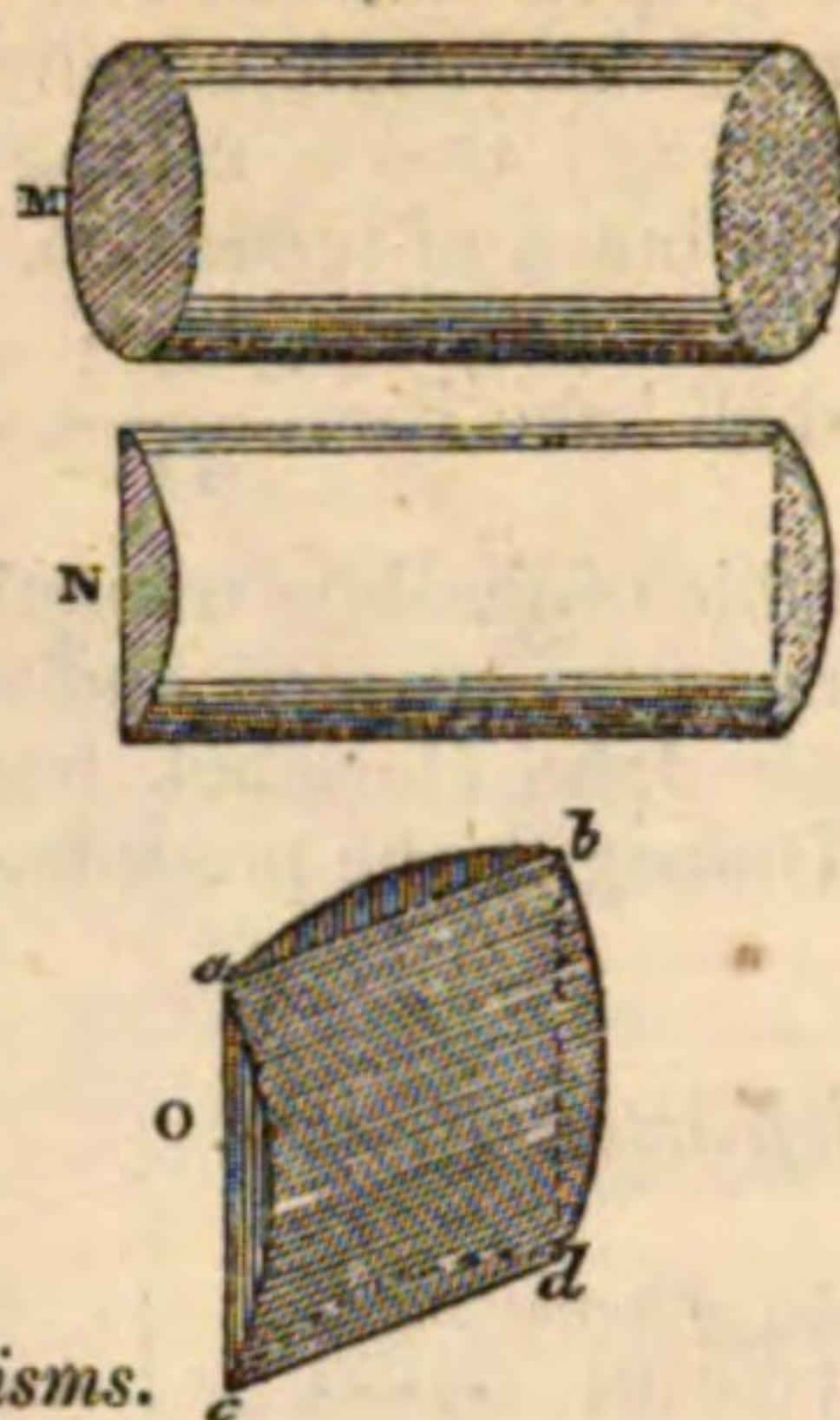
¹ Assuming the specific gravity to be 1.044, the same as oil of cinnamon.

Dioptries. 10. A *cylindrical lens* is shewn at M; it is merely a cylinder of glass, or any other transparent body.

11. A *plano-cylindrical lens*, shewn at N, has one of its surfaces plane and the other cylindrical.

12. A *transverse cylindrical lens*, shewn at O, resembles two plano-cylindrical lenses, plane transversely, or with their lengths at right angles to each other, and joined together by their plane surfaces at *a b c d*.

Fig. 22.

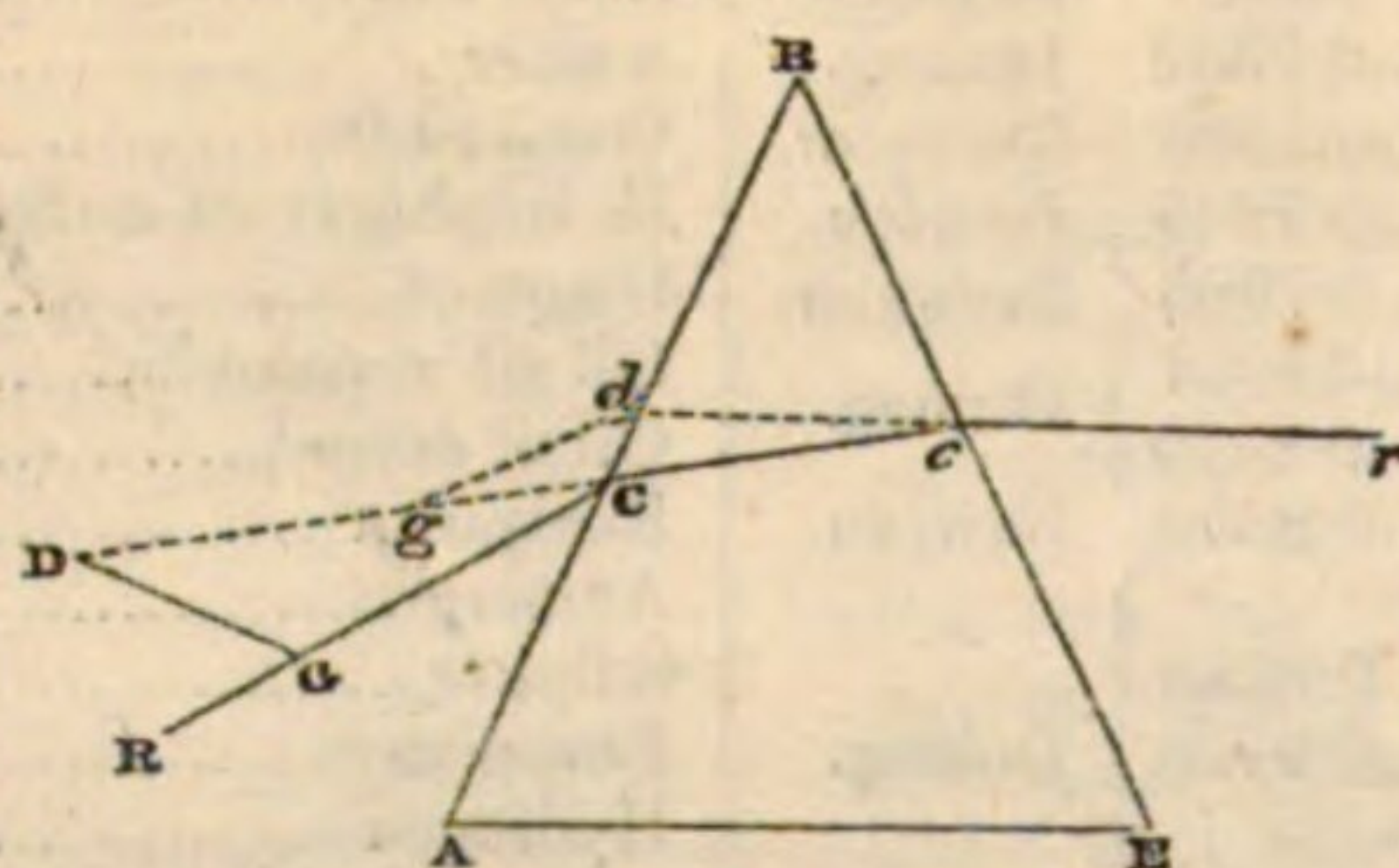


Refraction through Prisms.

As prisms are essential parts of optical instruments, and are of peculiar value in experiments on light, it is necessary to have a correct idea of the phenomena which they exhibit, in refracting rays of light.

Let ABE be a prism of two equal sides BA, BE, and made of glass whose index of refraction is 1.500, or whose ratio of refraction is as 1.500 to 1, or as 3 to 2, and let RC be a ray incident on its first surface at C. It is required to determine the path of this ray after it has suffered refraction at both its surfaces AB, BE. From any scale set off CG equal to 10

Fig. 23.



divisions, and CR equal to 15, and through G draw GD perpendicular to AC. From the point C, and on the line CD, set off CD equal to CR, and through D and C draw DCc, — Cc will be the refracted ray. From a scale on which Cc is 10, set off CcG equal to 15 parts, and drawing gd perpendicular to BE, make cde equal to cC, and draw through d and c the line dcr, — cr will be the path of the ray refracted by the second surface BE of the prism. When the radius Cc will not reach the perpendicular gd, the ray Cc will not be refracted at all, but will suffer total reflexion. When total reflexion commences, the point d will fall in the line EB, and the perpendicular gd will touch the circle described with the radius cC round c, at the point d. At all greater angles of incidence the ray Cc will be totally reflected.

The sine of the angle of incidence at c, when the ray Cc is not able to emerge from the prism, but suffers total reflexion, will be found in the case of plate glass (whose

index of refraction is 1.500), to be equal to $\frac{1}{1.500}$, or $\frac{2}{3}$, or

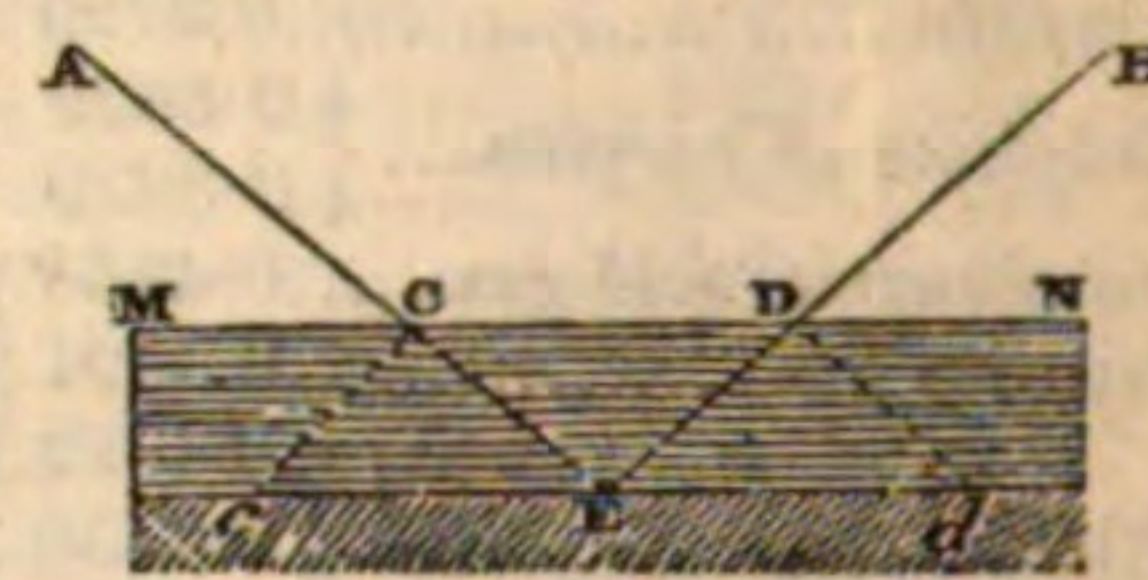
0.666; the angle corresponding to which is $41^\circ 48'$.

The total reflexion which thus takes place within transparent bodies, is a very remarkable and highly interesting phenomenon. The light is far more brilliant than what is obtained from the brightest silver, which gives more reflected light than any other metal; and it possesses curious physical properties, which will be explained in a subsequent part of the article. The phenomenon of total reflexion may be finely seen by filling a tumbler-glass with water, and placing it above the head so as to see the image of a candle reflected from the lower side of its surface when at rest. The brilliancy of the image surpasses that of every other species of reflexion. Diamonds, precious stones, and the glass ornaments of chandeliers, &c. &c., are often cut so as

to send to the eye light that has suffered total reflexion. Dioptries. The brilliant white lustre of dew-drops arises from totally reflected light.

To a person under perfectly still water, the vision of objects either out of the water or on the bottom, must be very singular. The whole visible heavens, in place of being a hemisphere, will appear like a cone, with an angle of 97° . "All objects," says Sir John Herschel, "down to the horizon, will be visible in this space, and those near the horizon much distorted and contracted in dimensions, especially in height. Beyond the limits of this circle will be seen the bottom of the water and all subaqueous objects, reflected, and as vividly depicted, as by direct vision. In addition to these peculiarities, the circular space above mentioned will appear surrounded with a perpetual rainbow of faint but delicate colours." In order to understand this, let MN be the surface of the water, and E an eye at the bottom. Let DE be the direction in which

Fig. 24.

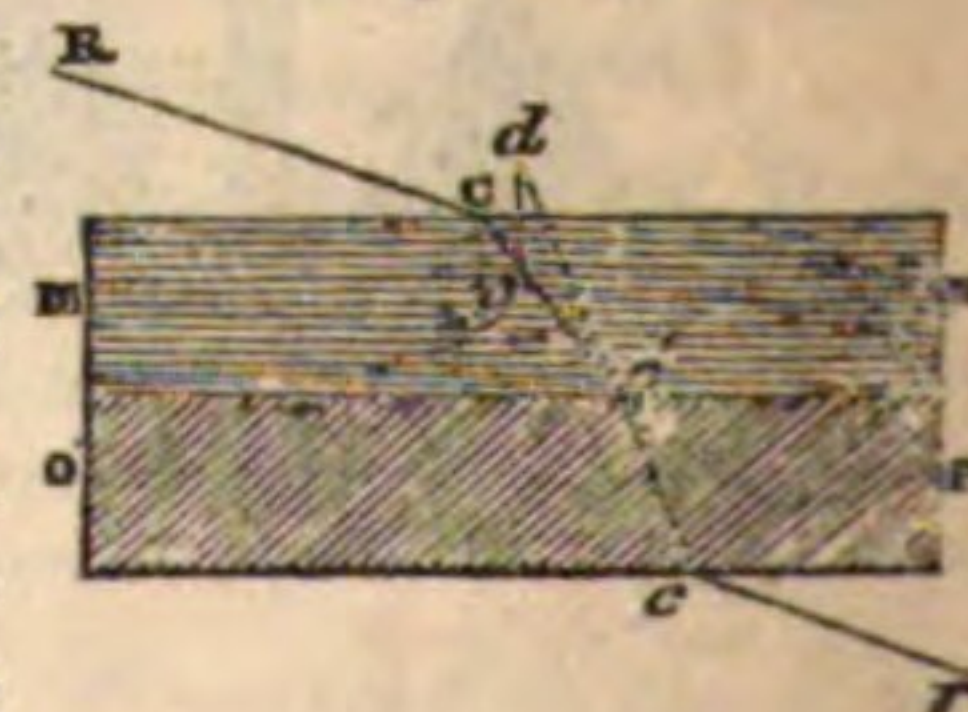


a horizontal ray ND, would be refracted at D, and CE the direction in which MC would be refracted at C. Then it is clear that all objects on the horizon will be seen in the directions ED, EC, and as the same is true in every azimuth, ACEDB will be a section of the cone, which will comprehend within it all objects in the visible horizon. The sun and moon will appear to rise at A and set at B. They will have the appearance of ovals, with their smaller diameters vertical. They will quit the horizon, and descend to it again very slowly, as the angle of refraction varies very slowly from 90° of incidence downwards. If a man fishing near N stands up to his knees in water, his knees will just be seen above the water, in the direction EB, and his body standing within the cone BEA, while his legs will be seen bright, and inverted in the direction of about EN, by the total reflexion of the lower surface MN, of the water. If we draw Cc and Dd, making the angles cCE, dDE, equal to CED, then all objects in the water, to the right hand of d, and to the left hand of c, will be seen by total reflexion from the inner surface MN of the water, in the space surrounding the cone AEB. An object at c will be seen by reflexion from the point C, in the direction EC, and an object at d by reflexion from D; but none of the objects between c and d will be seen by reflexion to the eye at E. Hence we see the reason why the fisherman's legs, like other objects under water, will be seen by total reflexion in a direction near to EN. The circular rainbow, or rather fringe of colours, which separates the objects out of the water from those which are beneath it, and seen by total reflexion, is that band of colour which always bounds light that is totally reflected.

It frequently happens, both in optical experiments and in optical instruments, that light is refracted at the surfaces of two media placed in contact, such as water and glass, and in compound lenses of flint and crown glass, either touching one another or united by a cement. In all such cases, it is necessary to determine the refraction which light experiences at their refracting surface. It is found by experiment, and may be proved theoretically, that the index of refraction for the separating surfaces of media is equal to the quotient of the most refractive, divided by the least refractive medium. Thus, the index of refraction for the separating surface of water and plate glass will be $\frac{1.500}{1.336}$, or 1.122, which is

nearly the same as that of tabasheer. In order, therefore, to find the refracted ray in this case, let MN be

Fig. 25.



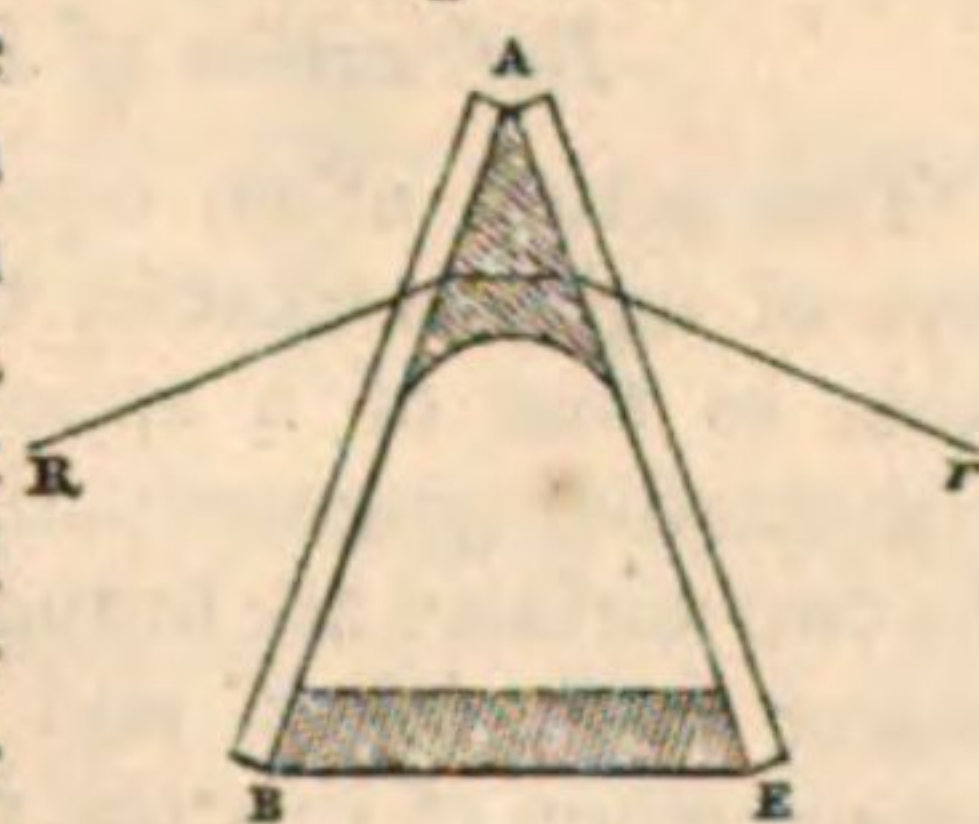
Dioptries. a parallel stratum of water resting upon a piece of parallel glass OP. A ray RC, will be refracted in the direction Cc' , and may be found by the method formerly given. In order to find the change produced in the direction of the ray at c' , take a point g' , in the line $c'C$, so that if $c'C$ is 1.122, $c'g'$ shall be 1.000, then drawing $g'd'$ perpendicular to the refracting surface, make $c'd'$ equal to $c'C$; and having drawn through the points d', c' the line $d'c'e'$,— $c'e'$ will be the refracted ray. This ray being incident on the second surface of the glass plate at c , will be refracted in a direction cr , which may be found by the method formerly described. It will be found both by projection and by experiment, namely, by looking through the compound plate MNOP, and observing any distant object, that the finally refracted ray cr is parallel to the incident ray RC.

If the angle RCA, fig. 23, the complement of the angle of incidence, is increased, the point c , where the refracted ray emerges from the side BE of the prism, approaches to E, and the angle rcE diminishes, till at a particular inclination of the incident ray, the angle RCA will become equal to the angle rcE . When this happens, the refracted ray Cc , will be equally inclined to the refracting faces of the prism BA, BE, and will be parallel to the base AB. This will be obvious by considering Cc as an internal ray incident on both sides of the prism, and at equal angles to each, in which case it will suffer equal degrees of refraction, and therefore be equally inclined to the refracting faces.

If the eye is placed at r to receive the refracted ray cr , it will see the luminous body, such as a candle, from which the ray RC proceeds, in the direction rc , and the angle which this ray rc forms with RC, will be the deviation of the ray produced by the refraction of the prism. Let us now suppose the candle to be fixed, and the prism turned round, so that the angle RCA may be increased, it will be found experimentally, and may be easily proved by projection, that the deviation of the ray rc is *least* when the angle RCA is equal to rcE , or when Cc is parallel to AE, and increases when Cc deviates on either side from this mean position. Now this position may be easily ascertained by placing the eye behind the face BE, and turning the prism till the refracted image of the candle, or other object, becomes stationary. When this takes place, Cc is parallel to AE or CcA is an equilateral triangle; and it may easily be shewn, by similarity of triangles, or by projection, that the angle of refraction at the first surface is equal to half the angle of the prism, or $\frac{1}{2} ABE$. Hence we obtain the following simple rule for finding the index of refraction, after having measured, with a goniometer or otherwise, the angle of incidence, or the complement of the angle RCA. Divide the sine of the angle of incidence by the sine of half the angle of the prism, and the quotient will be the index of refraction.

For the purpose of measuring indices of refraction, we do not require regular prisms of considerable size. Two small faces well ground and tolerably polished, are sufficient for this purpose. They need never be larger than the pupil of the eye, and will answer well enough if they are of the size of a pin's head. If we wish to measure the index of refraction of fluids, we have only to place a drop of the fluid at the angular point A, of two pieces of parallel glass fixed at any angle by a piece of wood or wax BE. Enough of the fluid for the purpose will be retained, by capillary attraction at the point A, and after measuring the angle BAE of the prism, and the angle of incidence at

Fig. 26.

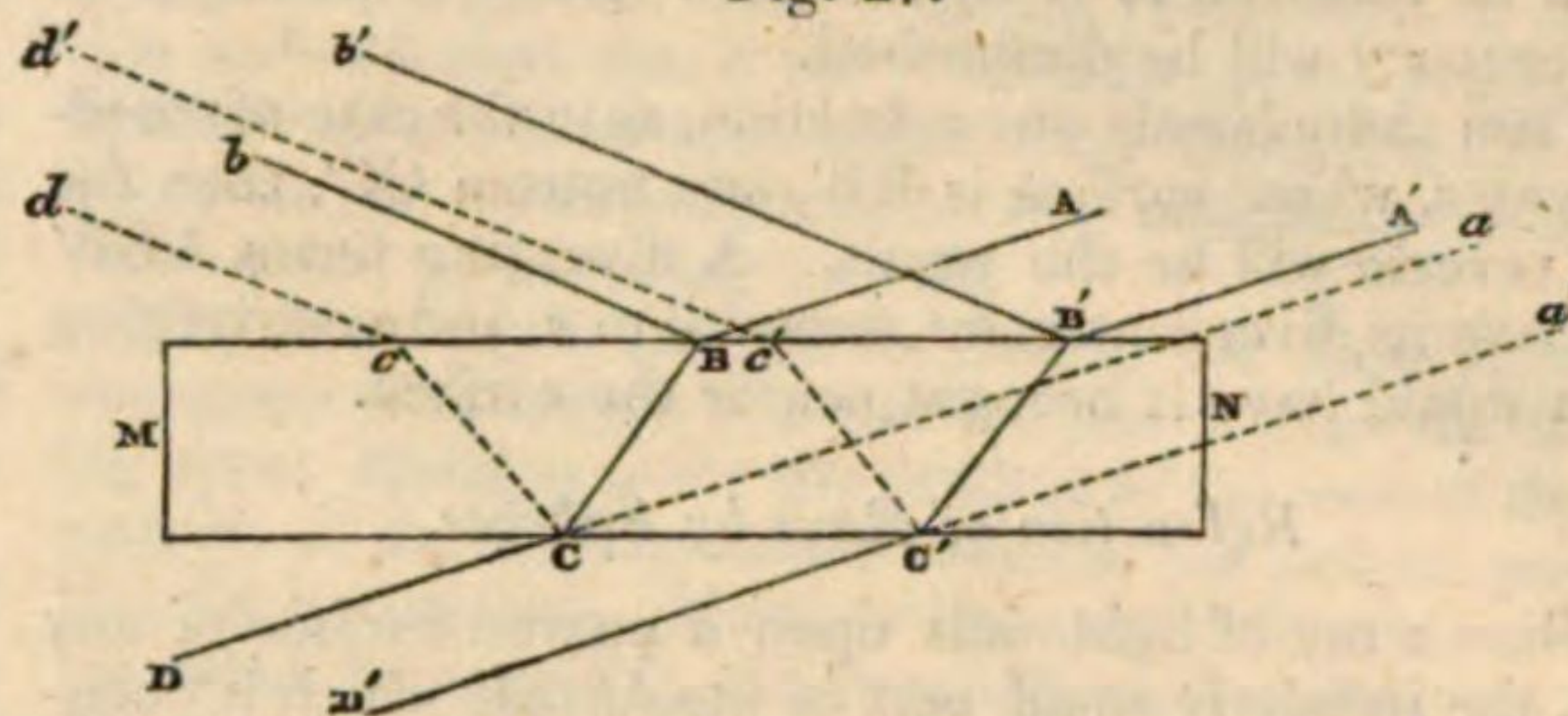


which the image of the candle becomes stationary, the index of refraction will be found as before.

Refraction through Plane Glasses.

Every person is acquainted with the fact that light which passes through plane glasses, or glasses which have their two surfaces flat and parallel, like MN, in the annexed figure, does not suffer any very perceptible change, either

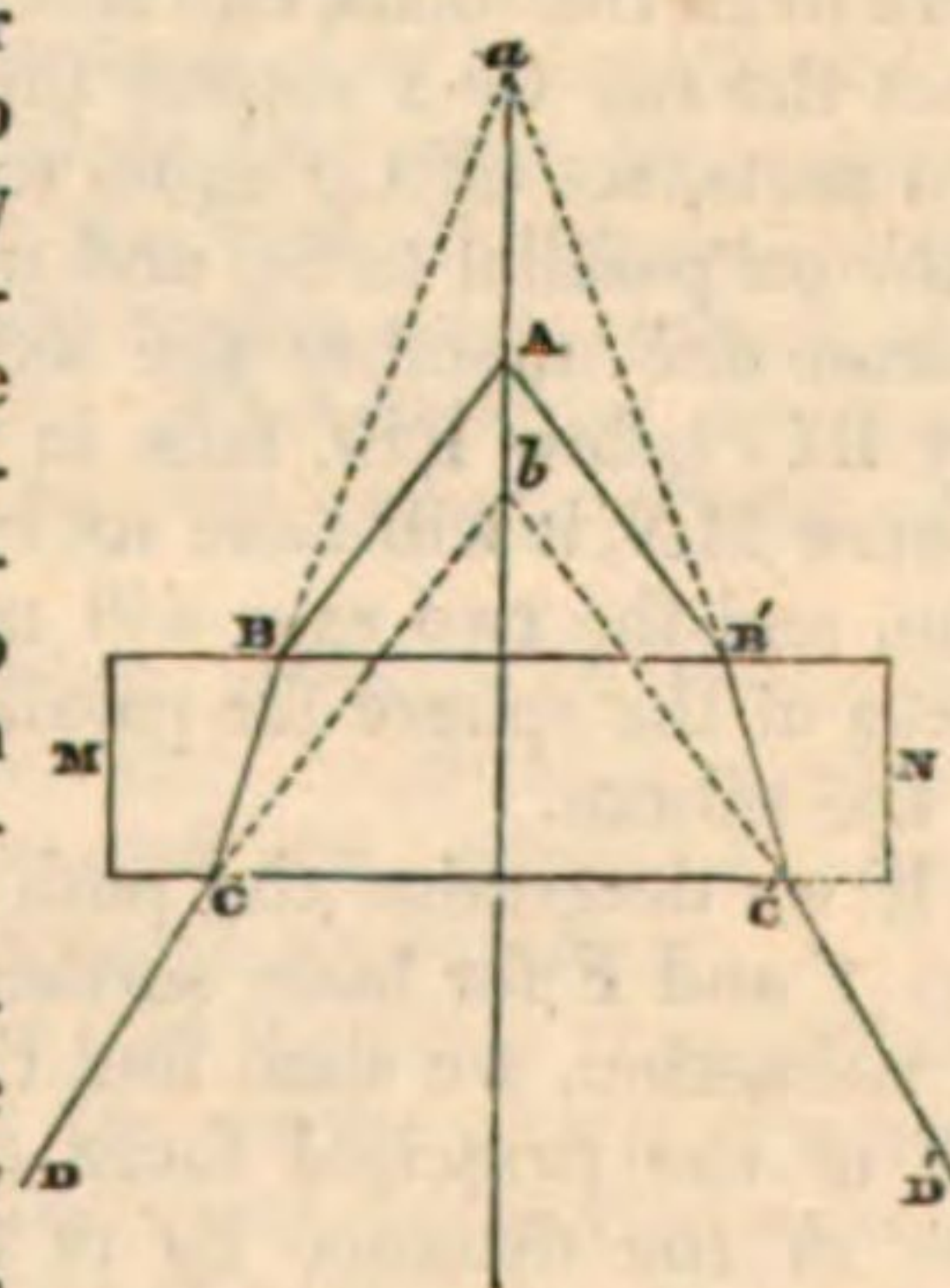
Fig. 27.



in its general direction, or in the parallelism, convergency, or divergency of its rays. If AB, A'B', for example, be two parallel rays incident on the plate of glass MN, they will suffer equal refractions at B, B', because they are incident at the same angles, and the refracted rays BC, B'C', will therefore be parallel. These parallel rays again falling upon the second surface at C, C' will suffer equal refractions there, and will emerge parallel in the lines CD, C'D'. Hence we conclude that parallel rays after transmission, at any obliquity, through a plane glass, will emerge parallel. But as the rays DC, D'C', will, to an eye at D and D', be seen in the directions DCa, D'C'a', their absolute directions in space are altered, and the difference between the real and the visible direction will increase with the obliquity of the rays AB, A'B', and with the thickness of the plate of glass. If we suppose MN to be part of a looking-glass, silvered on its lower side CC', then the refracted rays BC, B'C', will, after reflexion at C, C', in the directions Cc, C'c', be refracted at c, c' , into the parallel directions $cd, c'd'$. But the rays AB, A'B', will be reflected, though in a much fainter degree, in the directions Ab, A'b', so that an eye placed so as to receive these rays, will see the bright image reflected from the silvered surface, in the direction dc , and the faint image reflected from the first surface, in the direction bB , at a distance from each other depending on the obliquity of the reflexion, and on the thickness of the plate. A candle, for example, will be seen double at a short distance from the mirror; but a larger object, in order to be seen double, must be viewed at a greater distance. At great obliquities, and when the objects are very luminous, such as gas-burners, &c., other images will be seen by reflexions at c, c' , and subsequent reflexions from the other side of the plate. If the two faces of the plate are not exactly parallel, the bright and faint images above described, will change their distance, sometimes overlapping each other, and sometimes separating, according to the part of the plate on which they fall, though the angle of incidence may remain the same.¹

When *diverging* and *converging* rays pass through a plane glass, their degree of divergency and convergency is altered by it,

Fig. 28.



¹ We had once a looking-glass of this kind sent to us as a curiosity by a gentleman, who valued it on account of its remarkable properties. It differed from all the rest in his possession, only in its being the worst.

Dioptries. and also the position of the points of divergency and convergency. Let ABB' be a pencil of rays diverging from A , and incident upon the plane glass MN . The emergent rays $CD, C'D'$, will, after their second refraction at C, C' , proceed as if they had come from the point b , and their angle of divergency will now be bBB' . Hence a plane glass brings the divergent point of diverging rays nearer to it, and increases the angle of divergency. For the same reason, if DdD' is a converging beam of light, its point of convergency b , will be removed to A by the plane glass, or its angle of convergency will be diminished.

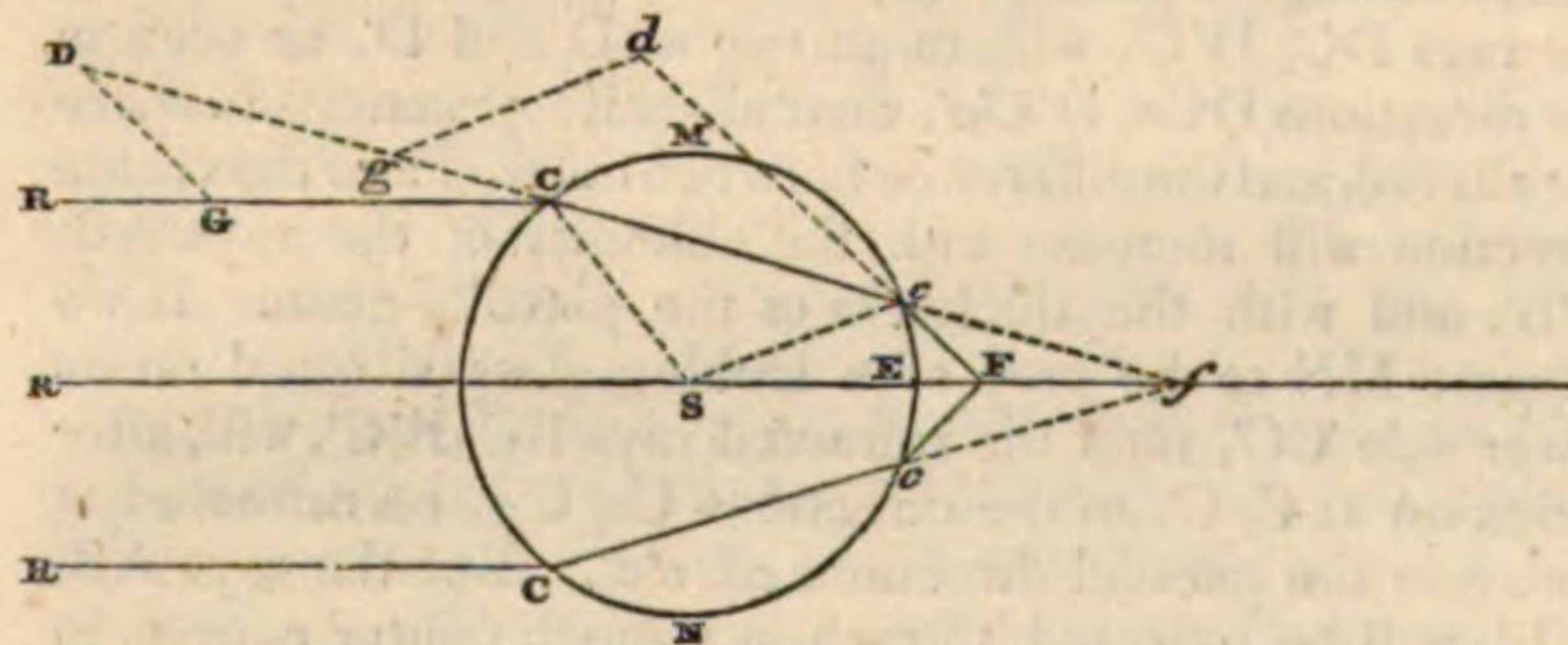
When there is only one refraction, as in the case of standing water, whose surface is BB' , and bottom CC' , then the very reverse will be the result. A diverging beam ABB' will have its divergent point removed to a , and a converging beam would have it brought nearer the surface.

Refraction of Rays by Spheres.

When a ray of light falls upon a curved surface of any kind, the infinitely small part of the surface which it occupies may be considered as coinciding with the tangent to the surface, or with a plane surface touching the curve at the point of incidence. When the surface is spherical, this tangent plane is perpendicular to the radius, or the line drawn from the centre of the sphere to the point of incidence. Hence it is always given when the centre is given.

Let MN be the section of a sphere of glass, whose index of refraction is 1.500, as before, RSf a ray passing through

Fig. 29.



its centre S , and therefore unrefracted, because it is incident perpendicularly on both surfaces, and RC, RC , other rays parallel to, and equidistant from, RSf , it is required to find the path of one of these RC , through the sphere. Join SC , which will be perpendicular to the surface at C . From a scale on which RC is three parts, set off RC equal to 1, and draw CD parallel to CS , (which is the same as drawing it perpendicular to the elementary surface, or tangent to the sphere at C). Make CD equal to CR , and through D and C draw the line DCf , meeting the posterior surface of the sphere at c , and the axis of the sphere at f . The point f would have been the focus, had there been no second surface to re-fract the ray Cc a second time. On a scale in which Cc is two parts, set off Cg equal to 1 part, and having joined Sc , draw gd parallel to Sc , and make cd equal to cC . Through c draw dcF , meeting the axis of the sphere in F . As the ray RC , below RSf , falls in the very same manner on the sphere MN , it will have its refracted ray in a similar direction, and the two rays will meet at F , which is called the focus of the sphere for parallel rays, or the principal focus of the sphere.

If we determine the path of the ray RC , and find the foci f and F for both surfaces; by using different indices of refraction, we shall find that in every case the distance EF of the principal focus of the sphere is exactly one-half of the distance Ef of the focus for the first surface, and that FS is to ES as the sine of incidence or the index of refraction is to the difference between twice the sine of incidence and twice the sine of refraction; that is, in glass as 1.500 is to 3.000—2.000, or as 1.500 to 1.000.

Hence we have for different refractive bodies the following results:—

Index of refraction.

Tabasheer,.....	FS is to ES as 1.111 is to 0.222
Water,.....	FS is to ES as 1.336 is to 0.672
Glass,.....	FS is to ES as 1.500 is to 1.000
Zircon,.....	FS is to ES as 2.000 is to 2.000

Hence it appears that in the case of zircon, and all other bodies whose index of refraction is 2.00, the focus F falls exactly on the posterior surface of the sphere at E , and it therefore follows that in diamond, phosphorus, &c., and all bodies whose refractive power exceeds 2.000, the principal focus falls *within the sphere*, the focus advancing from E towards S , as the index of refraction increases, and reaching the centre of the sphere S , when the index of refraction becomes infinite.

It may be interesting to trace the distances E of the principal focus F from the sphere, in bodies of various refractive powers, supposing the radius of sphere to be one inch, and placed in vacuo.

	Distances $E F$.	Feet.	Inches.
Hydrogen,.....	3623 inches.....	301	11
Oxygen,.....	1838 —	153	2
Atmospheric air,...	1701 —	141	9
Phosgen,.....	432 —	36	0
Tabasheer,.....	4 —	0	4
Water,.....	0.98 —	0	1 nearly.
Glass,.....	0.50 —	0	$\frac{1}{2}$ an inch.
Zircon,.....	0.00 —	0	0
Diamond,.....	within the sphere.		

In spheres of diamond and other substances of high refractive power, a refracted ray Cc may fall so obliquely upon the inner surface of the sphere, that it would be totally reflected, and would therefore be carried round the surface of the sphere, without the possibility of making its exit. If the length of the refracted ray Cc should cut off an arch which is an aliquot part of a circle, the ray would describe a regular polygon, being always reflected from the same points; but if it was not an aliquot part of a circle, the points of reflexion would vary in every revolution of the ray.

The following is the rule for finding the principal focus of a sphere, or its focus for parallel rays:—Divide the index of refraction by twice its excess above unity, and the quotient is the distance of the principal focus from the centre of the sphere.

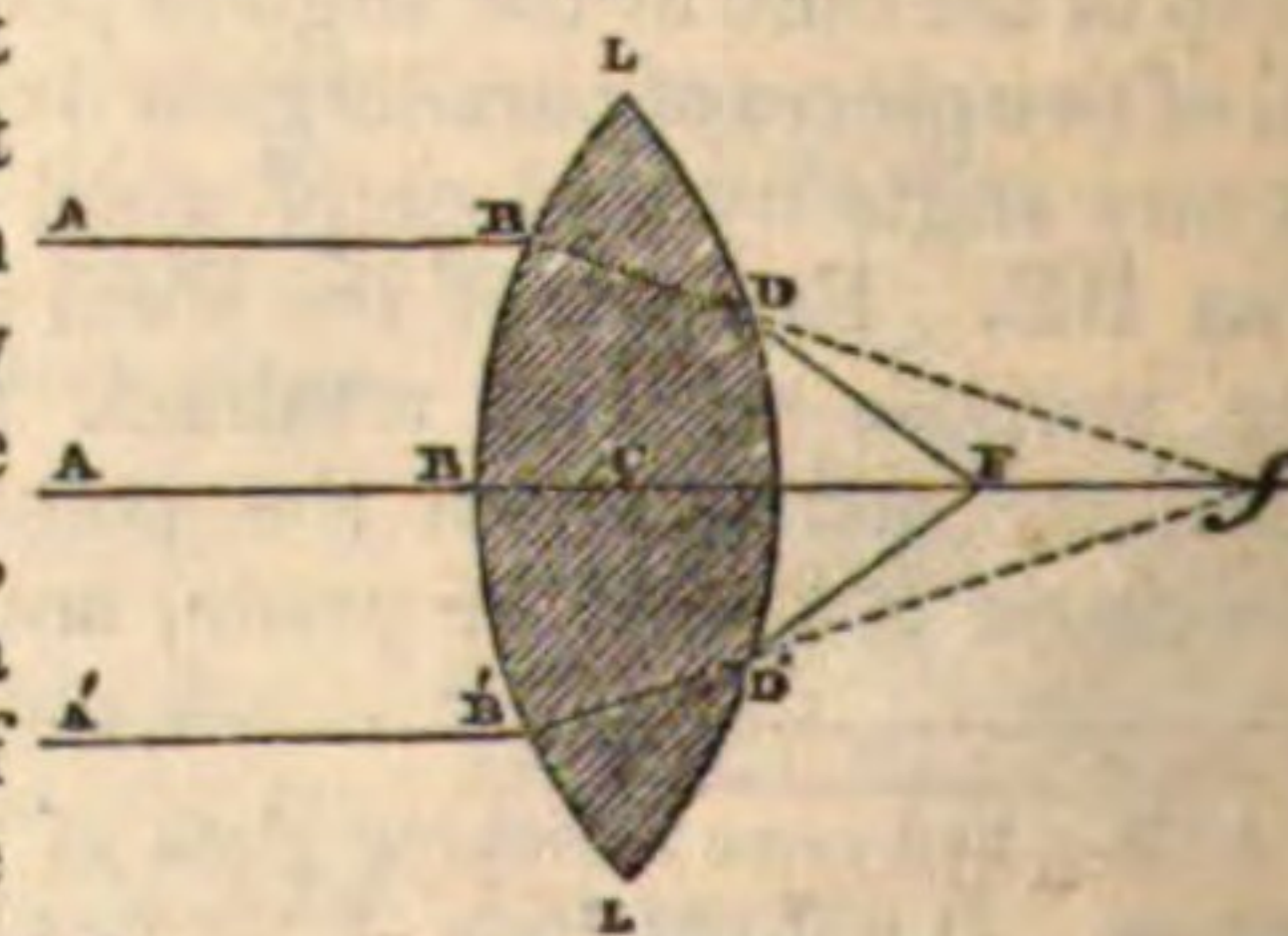
When the rays RC, RC , in place of falling on the sphere in directions parallel to the axis, or to one another, proceed from a near object, and always from a point in the axis RSE , their focus may be found by the very same method which we have already given. When the point from which the rays diverge is very distant, the focus of such rays will be a little farther from the sphere than F , and as the radiant point approaches to the sphere, the focus F will recede from it, as will be more fully explained when we treat of the progress of rays through lenses.

Refraction of Rays by Convex Lenses.

The action of an equally convex lens in refracting the parallel rays of light, is exactly the same as that of a sphere,

with this difference only, that the two surfaces are brought nearer each other, and in consequence of this the ray refracted by the first surface falls upon the second surface, at a different point, and at a different angle, the effect of which is to produce a change in the position of the focus.

Fig. 30.



Dioptries. Let LL be a double and equally convex lens of glass, a line Af passing through the centre C , or middle point of its greatest thickness, is called its axis. Let parallel rays $AB, A'B'$, fall upon the first surface, at the points B, B' ; these will be refracted in directions $BD, B'D'$, which will be determined by the method shewn in fig. 28. Had there been no second surface, these rays would have converged to a focus at f , but as they meet the second surface of the lens at D and D' , they will there be refracted, as shewn in fig. 28, for the sphere, so as take the directions $DF, D'F'$, and have their principal focus at F .

The following is the rule for finding the principal focus of a glass lens unequally convex:—Multiply the radius of the one surface by the radius of the other, and divide twice this product by the sum of the same radii.

If the glass lens is equally convex, and has its index of refraction 1.500, the distance CF , or its principal focal distance, will be equal to the radius of any of its surfaces.

The following is the rule for finding the principal focal distance of a plano-convex lens of glass. When the convex side is exposed to parallel rays, the focal distance, reckoned from the plane side, will be equal to double the radius of the convex surface, diminished by two-thirds of the thickness of the lens. When the plane side of the lens is exposed to parallel rays, the distance of the focus from the convex side will be equal to twice the radius.

When the rays AB, AB are oblique to the axis, the middle ray AC passing through the centre C , will obviously suffer refraction at B , but as it falls upon the second surface at the same angle, it will be refracted a second time in an opposite direction, so that it will proceed in a direction df parallel to AB . The rays AB, AB will suffer refraction at the points B, B' , and also at the points D and D' , and it will be found by projection that they meet in a focus F in the axis df .

In the preceding case the parallel rays are supposed to issue from some very distant object; but if the object from which the rays proceed is near or not very distant from the lens, its focus will recede from the lens, in proportion as the object or point of divergence approaches to it. This fact scarcely requires to be proved, for it is manifest that as the radiant point approaches to the lens, the rays fall more and more obliquely on the first surface, and less and less obliquely on the second, so that the deviation produced by refraction is not sufficient to bring them to a focus so near the lens as the point F , in fig. 30. This will be better understood from fig. 32, where LL is a convex lens, whose focus for parallel rays is F . Let RL, RL be rays diverging from a candle or other body, at R , then, if we trace the refracted rays by the method already given in fig. 27, we shall find that they will meet at

a point f , farther from the lens than F , and that if the point R advance to R' , the focus f will advance to f' , and so on, the focus f receding from the lens as R approaches to it. When the distance RC is equal to twice CF , or twice the principal focal distance, the distance of the focus f from the lens will be equal to the distance of the radiant point from it, or Cf will be equal to CR . When R comes nearer C , f goes rapidly away from it, and when R comes to F , which is called the anterior focus, CF being equal to CF , the rays

will be parallel, or what is the same thing, the focus f will have retired to an infinite distance. When R comes nearer to C than F , the rays will diverge, after passing through the lens, as if they came from some point in front of the lens, and this point, or *virtual focus*, as it is called, will approach to the lens as R approaches it, in moving from F towards C . The points R and f , and R' and f' , are called *conjugate foci*, because it may be shewn that rays diverging from f will be refracted to R , and rays diverging from f' to R' . It is indeed a general truth in all the phenomena of refraction and reflexion, that if the refracted rays are supposed to be the incident ones, the incident rays will be the refracted ones; for the ray experiences the very same action in an inverse order, by retracing its path.

The following is the rule for finding the focus f , or the conjugate focal length of a convex lens of glass for diverging rays: Multiply twice the product of the radii of the two surfaces of the lens, by the distance of the radiant point or RC , for a *dividend*. Multiply the sum of the two radii by the same distance RC , and from this product subtract twice the product of the radii for a *divisor*. The quotient of the dividend divided by the divisor will be the focal distance Cf required.

When the lens is *equally-convex*, multiply the distance of the radiant point RC , by the radius of the surfaces, and divide that product by the difference between the same distance and the radius, and the quotient will be the focal distance Cf required.

If the lens is *plano-convex*, divide twice the product of the distance of the radiant point RC , multiplied by the radius of the convex surface, by the difference between that distance and twice the radius, and the quotient will be the distance of the focus from the centre of the lens.

When converging rays fall upon a convex lens, they are always refracted to a point between the lens and their point of convergence. Let

RL, RL be rays converging to any point r , behind the lens LL , it is very evident that refraction must always make them cross the axis RCr of the lens somewhere between r and the lens, and always between the principal focus F and the lens. The exact point may be found by the methods already given. As the point of convergence r recedes from the lens, the focus f will approach to the principal focus F , and when r is infinitely distant, the rays RL, RL , become parallel, and f will coincide with F . When r approaches to C , f will also approach to it.

The focus of a double convex glass lens, when its thickness is small, for converging rays may be found by the following rule: Multiply twice the product of the radii of the two surfaces by the distance rC of the point of convergence for a *dividend*. Multiply the sum of the two radii by the same distance rC , and add to this product twice the product of the radii for a *divisor*. The quotient obtained by dividing the above dividend by this divisor, will be the focal distance fC required.

When the lens is *equally-convex*, multiply the distance rC by the radius of the surfaces, and divide that product by the sum of the same distance and the radius, and the quotient will give the focal distance fC required.

In *plano-convex* lenses we must divide twice the product of the distance rC multiplied by the radius of the convex surface, by the sum of that distance and twice the radius, and the quotient will give the focal distance required.

Refraction of Rays by Concave Glasses.

In order to shew how to find the refracted ray when the

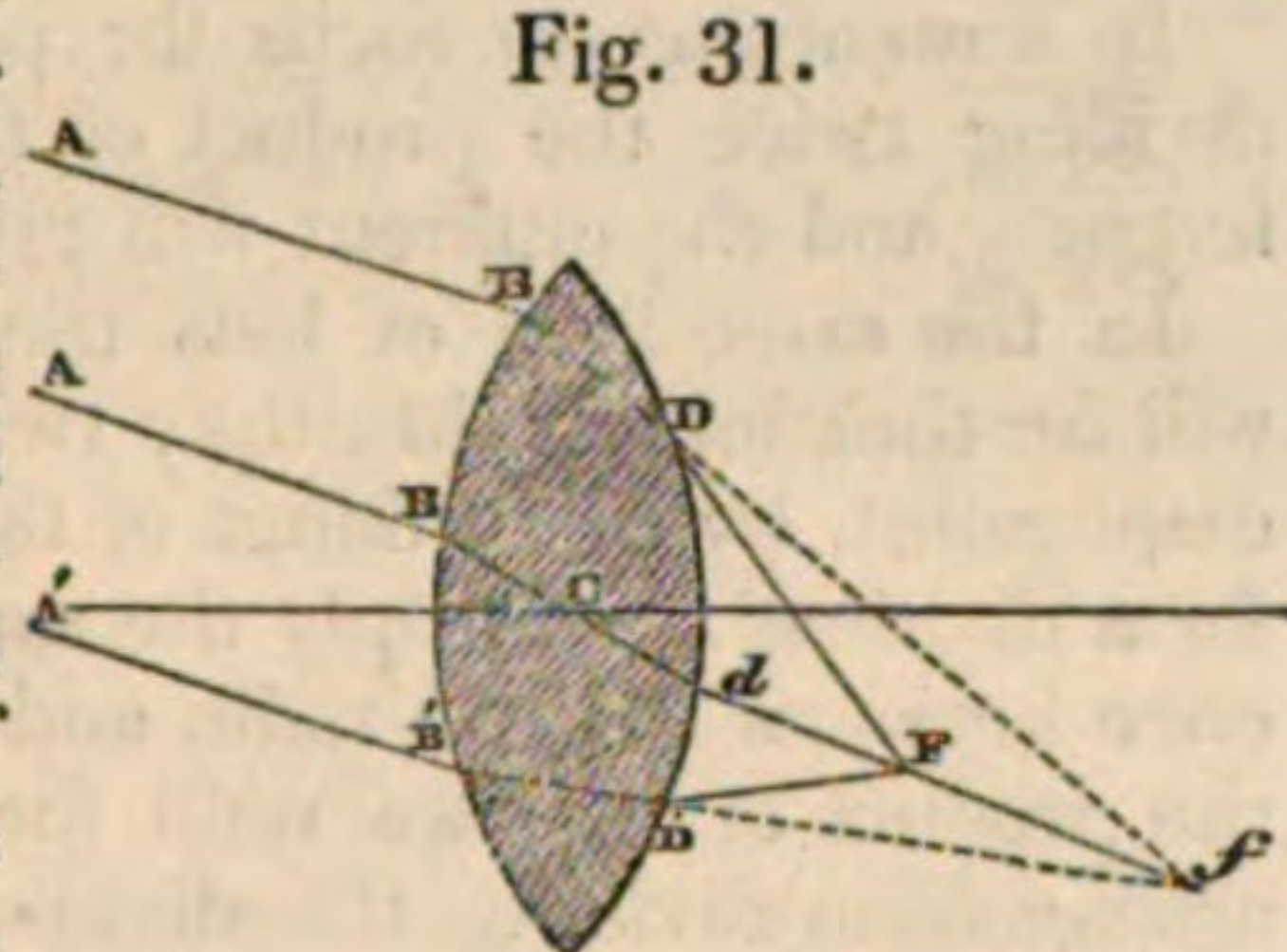


Fig. 31.

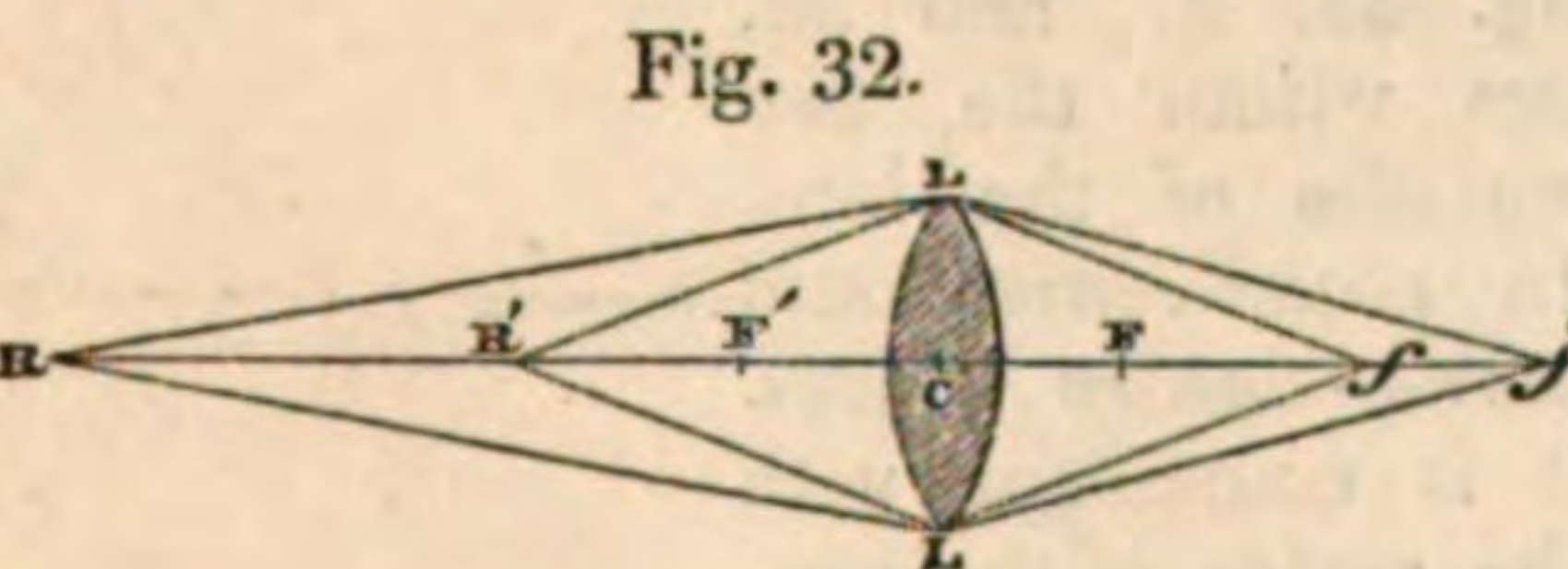


Fig. 32.

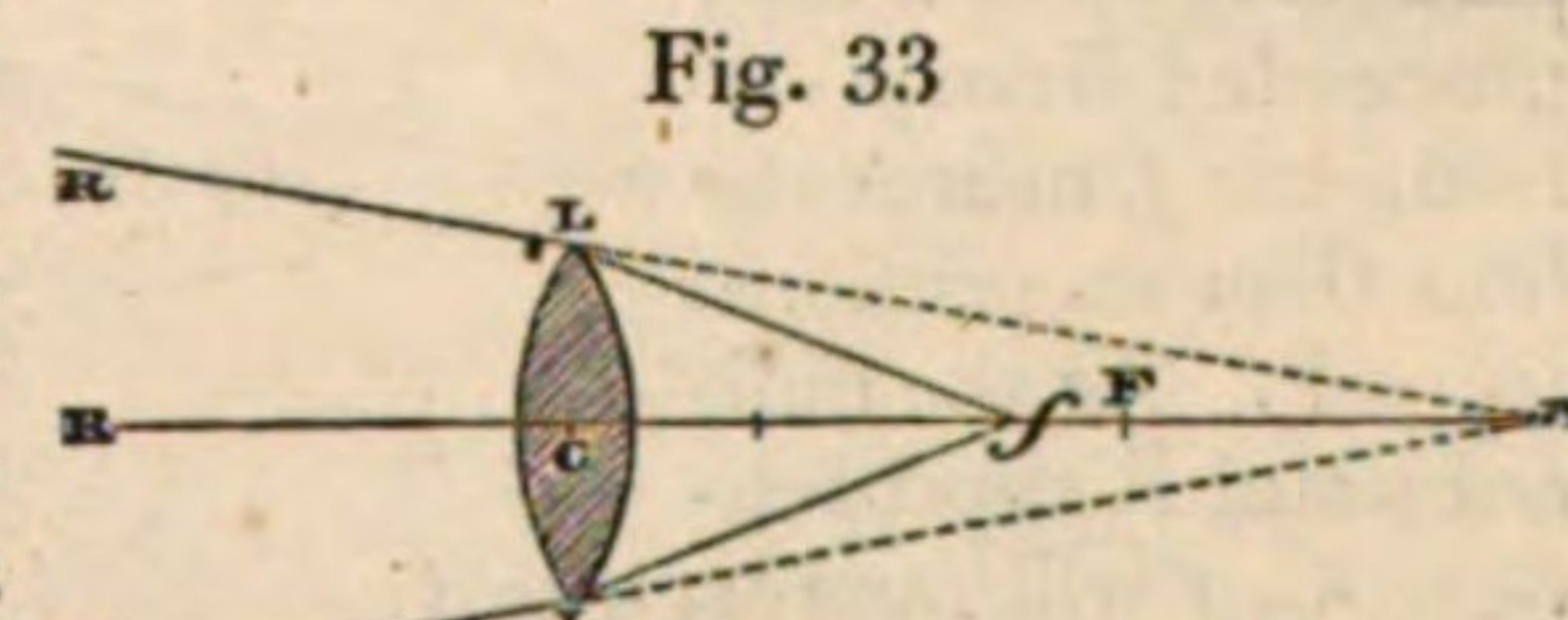


Fig. 33.

Dioptries. light is incident on a *concave* surface, let LL be a double and equally concave lens of glass, and RB, R'B' two rays parallel and equidistant from the axis RC of the lens. From a scale on which RB is 1.5, take BG equal to 1, and from G draw GD parallel to SB, the radius, and consequently perpendicular to the first concave surface of the lens. Make BD equal to BR, and through D and B draw Bb, which will be the ray refracted by the first surface. On a scale where bB is 1, make bBg equal to 1.5. From g draw gd parallel to bs, the radius of the second surface, and consequently perpendicular to that surface at b. Make bd equal to bB, and through b draw dbr, br will be the ray refracted by the second surface. In like manner the other ray RB will be refracted by the first surface in the direction B'b', and the two refracted rays br, b'r' will diverge as if they had proceeded from a point F, found by continuing br, b'r' backwards, which is called the virtual focus of the concave lens, LL.

If we trace *oblique parallel* rays through a double concave lens in the same manner as we have done for a convex one in fig. 31, we shall find that they will be refracted as if they diverged from a focus in the axis or ray which passes through the centre of the lens. The rules for finding the virtual focus of parallel rays refracted by a double or plano-concave lens, are the same as for convex lenses.

When *diverging* rays RB, RB, fall upon a concave lens LL, they will be refracted in lines br, b'r', more divergent than parallel rays, as if they proceeded from a virtual focus f, nearer the lens than its principal focus F. As the radiant point R approaches to C, f will approach to C.

The following are the rules for finding the virtual focus of a concave lens of glass for diverging rays. Multiply twice the product of the radii by the distance RC of the radiant point R for a *dividend*. Multiply the sum of the radii by the distance RC, and add to this twice the product of the radii for a *divisor*. Divide the dividend by the divisor, and the quotient will be the virtual conjugate focal distance fC. If the lens is *equally-concave*, multiply the distance of the radiant point R by the radius, and divide the product by the sum and the same distance and the radius, and the quotient will be the virtual focal distance required.

If the lens is a *plano-concave* one, multiply twice the radius by the distance of the radiant point, and divide this product by the sum of the same distance and twice the radius, and the quotient will be the virtual focal distance.

When *converging* rays fall upon a concave lens, their virtual focus will be without the principal focus on one side, if the point of convergence is without the principal focus on the other side. This case is shewn in fig. 36, where the rays RB, R'B', converging to f, without the principal focus F, will be refracted in the direction br, b'r', as if they had diverged from a focus at f' on the other side of the lens.

Fig. 34.

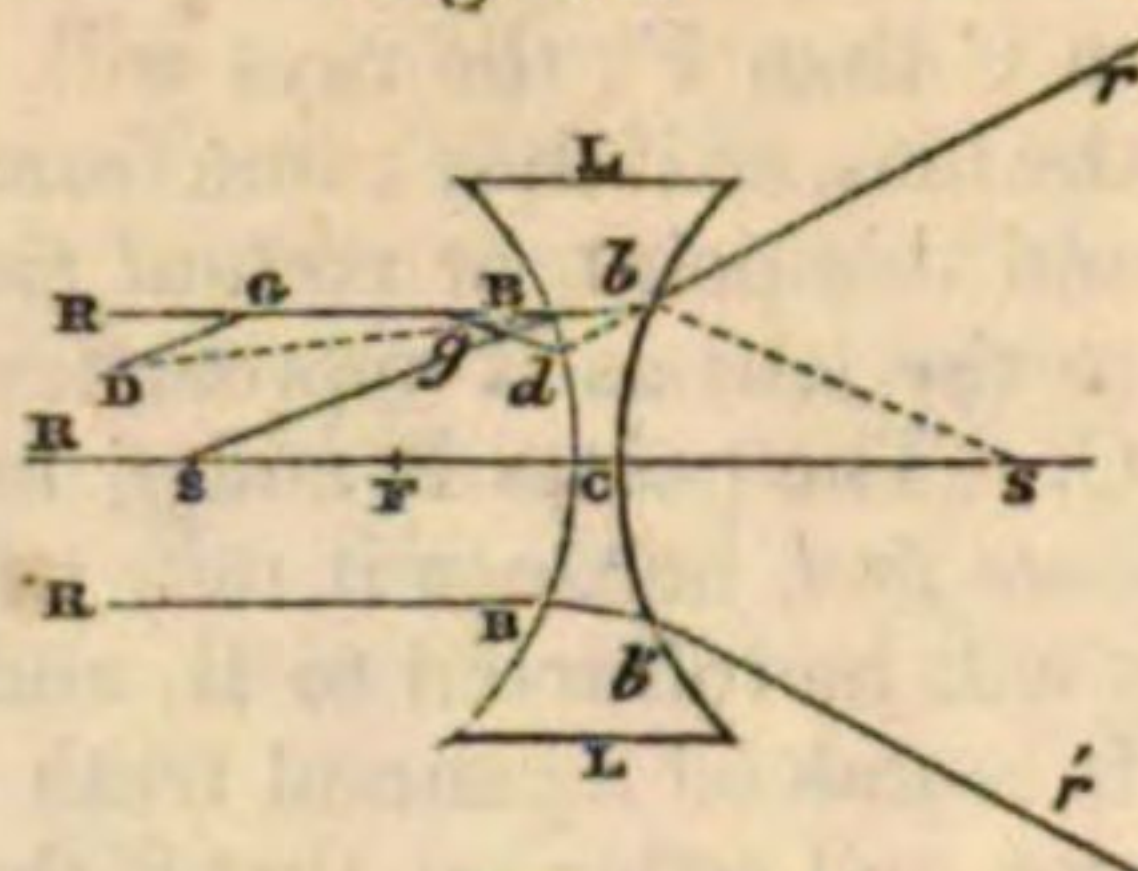


Fig. 35.

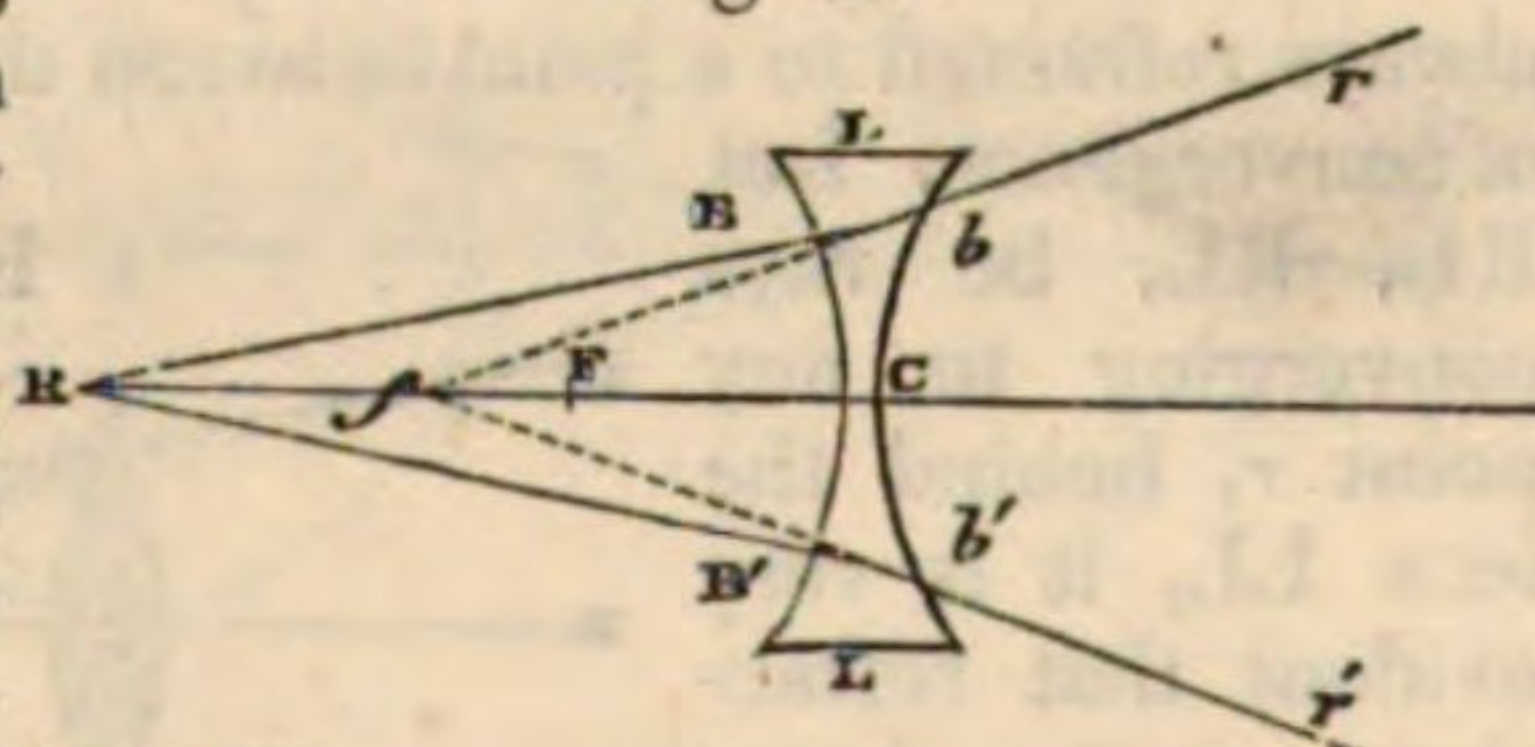
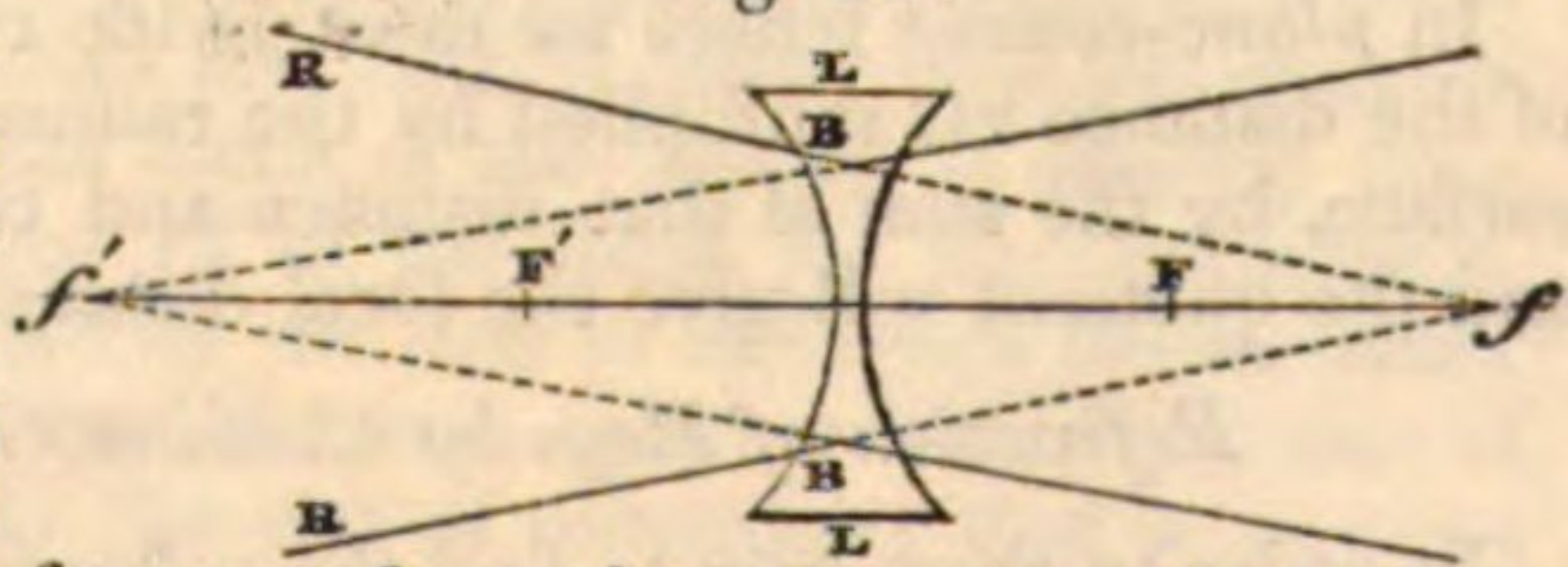


Fig. 36.



When fC is equal to twice the principal focal distance CF, Dioptries. the virtual focus of divergence f will be at the same distance on the left hand of C as the point of convergence f' is distant on the right hand. When f approaches the lens on the right hand, the virtual focus f will recede from it on the left. When f reaches F, the virtual focus will be infinitely distant, or the refracted rays will be parallel; and when f advances from F to the lens, the refracted rays will converge on the right hand of the lens, and the focus will advance towards the lens, as the point of convergence advances towards it.

The rule for finding the conjugate focus of a converging beam, for a doubly concave lens, is the same as that for diverging rays in a doubly convex lens. If the lens is plano-concave, the rule is the same as for diverging rays falling upon a plano-convex lens.

Refraction of Rays through Meniscuses, and Concavo-Convex Lenses.

It would be quite unprofitable to trace the progress of different rays through these various forms of glasses, both because they are but little used, and because the very same methods which are applicable to convex and concave surfaces, are applicable also to them. When used by themselves and for ordinary purposes, these lenses are inferior to the common convex and concave lenses, and therefore are seldom met with. We shall therefore content ourselves with giving the rules for finding their foci.

In a meniscus the focus for parallel rays is obtained by dividing twice the product of the two radii by their difference, and the quotient will give the focal distance.

In the same kind of lens the focus for diverging rays will be thus found: Multiply twice the distance of the radiant point, by the product of the radii of the two surfaces, for a dividend. Multiply the same distance by the difference between the two radii, and to their product add twice the product of the two radii for a divisor. The quotient arising from dividing the dividend by the divisor, will be the focal distance of the meniscus. This rule will answer also for converging rays.

In *concavo-convex* lenses the very same rules will apply, but the rays have a virtual focus in front of the lens, as in concave lenses.

In treating of the passage of oblique rays through a double convex glass, as shewn in fig. 31, we have stated that there is a point C, called the centre of the lens, through which the ray that passes suffers the same refraction at both surfaces, or emerges parallel to its original direction. In equally double convex lenses, this centre C is accurately in the middle part of the thickness of the lens; but in other forms of lenses it is not. Hence it is necessary to point out the method of finding this centre. In *double convex* or *concave* lenses, the centre C, see fig. 31, 37, and 38, lies within the two surfaces of the lens. In *plano-convex* and *plano-concave* lenses, it is coincident with the vertex of the convex or concave surfaces, and in *meniscuses* and *concavo-convex* lenses it lies without the thickness of the lens, and nearest to the surface which has the greatest curvature. Let R, r, figs.

Fig. 37.

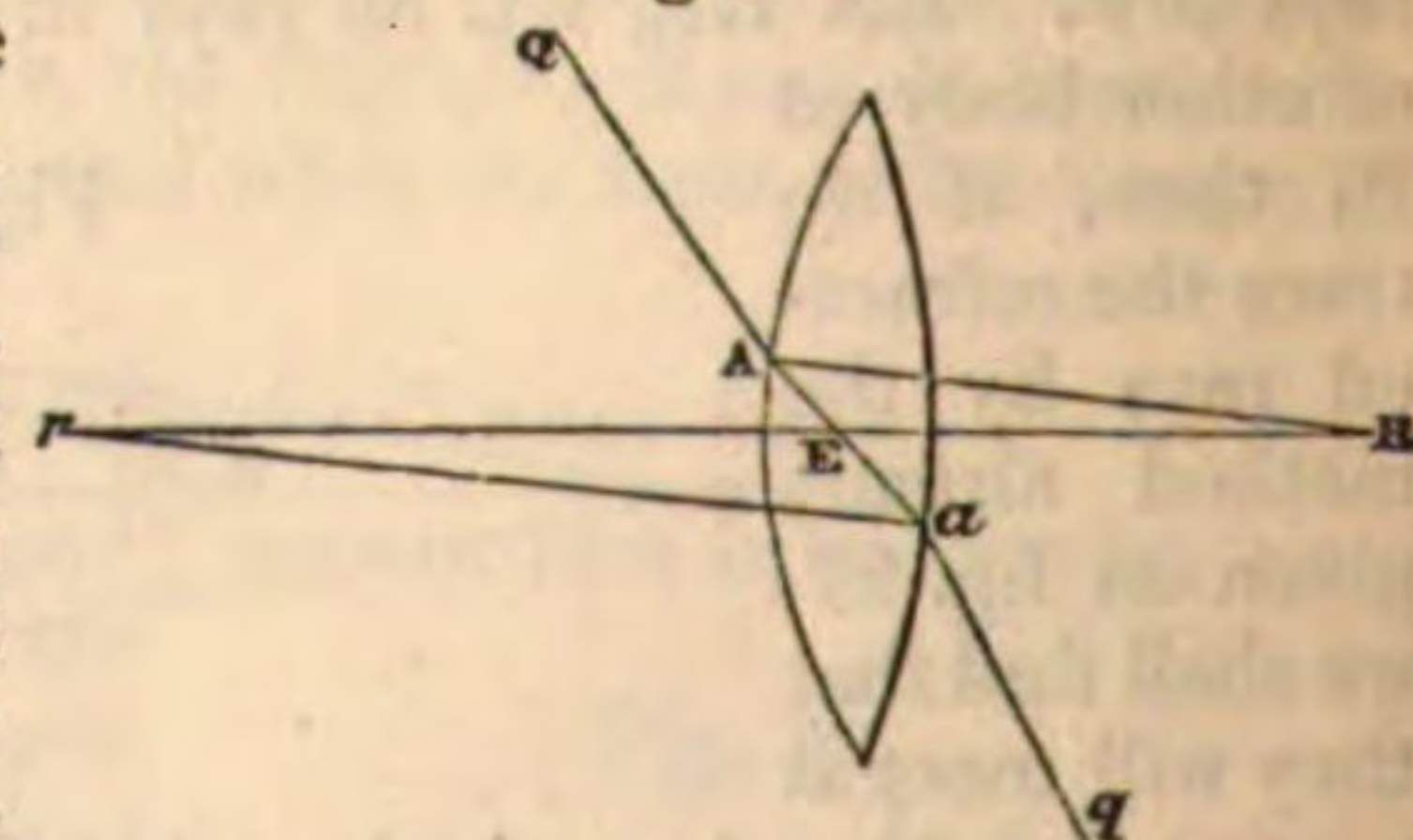
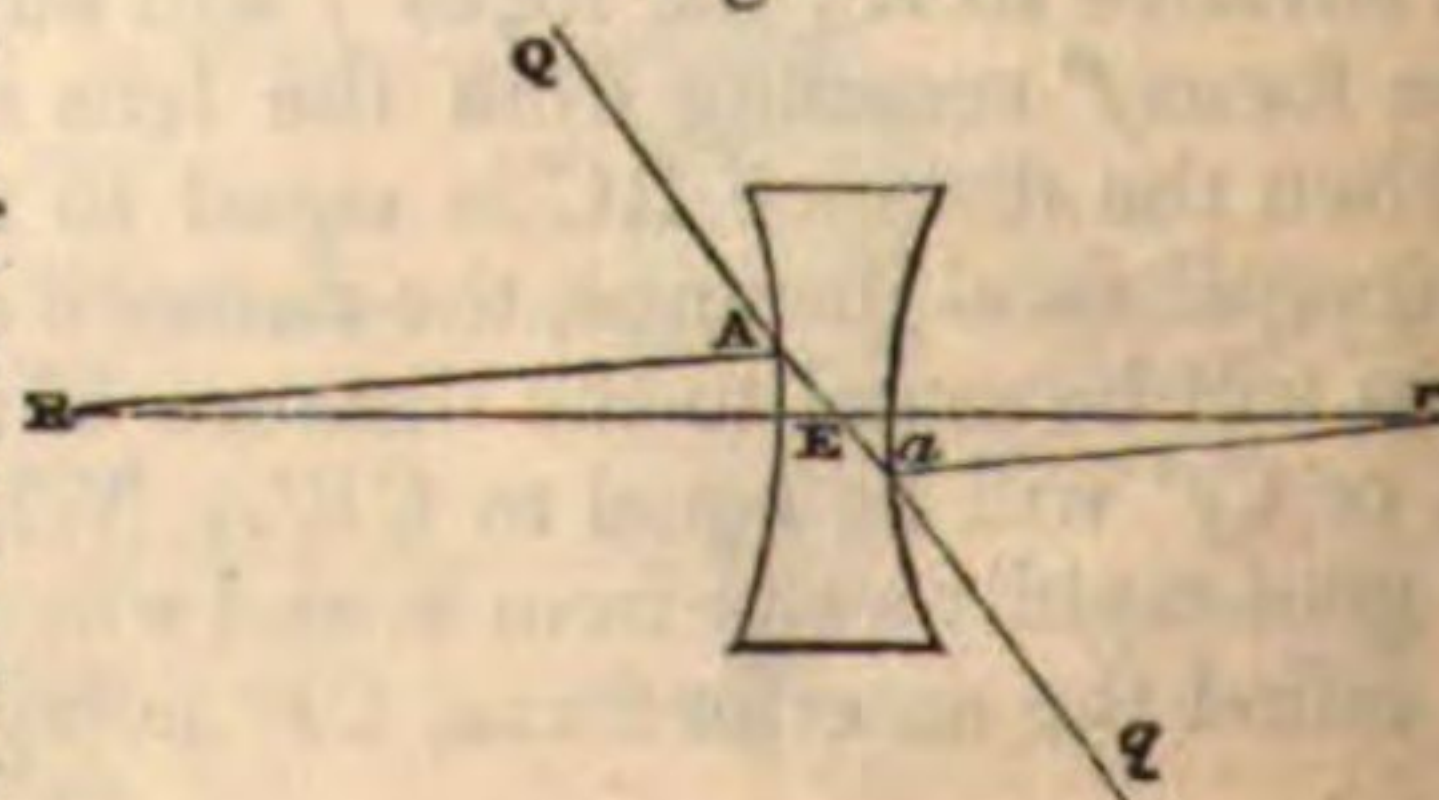
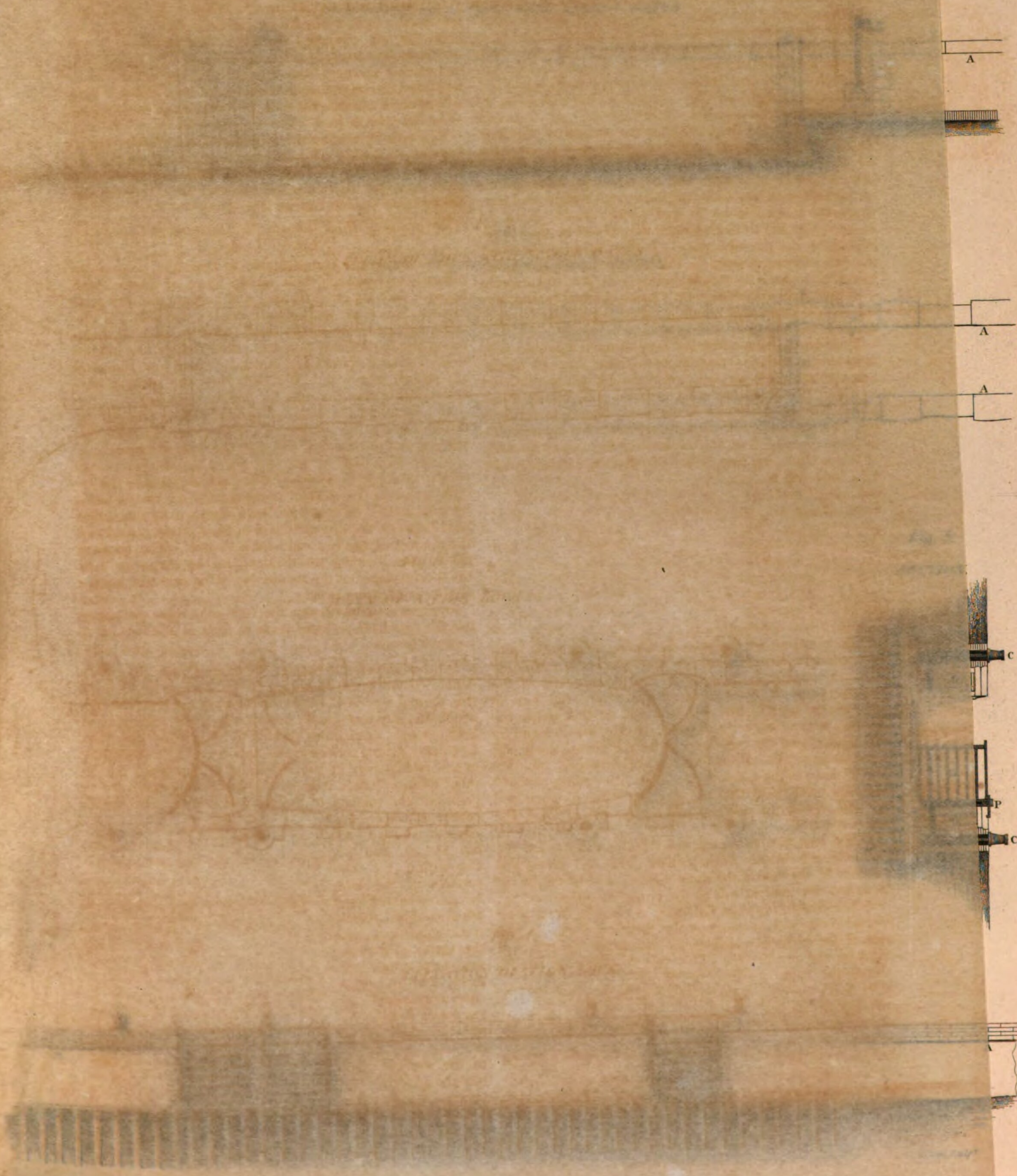


Fig. 38.





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Fig. 36.

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Refraction of Rays through Menisci, and Concavo-Convex Lenses.

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Fig. 37.



Fig. 38.

Fig. 1.

ELEVATION OF A LOCK WITH SINGLE GATES.

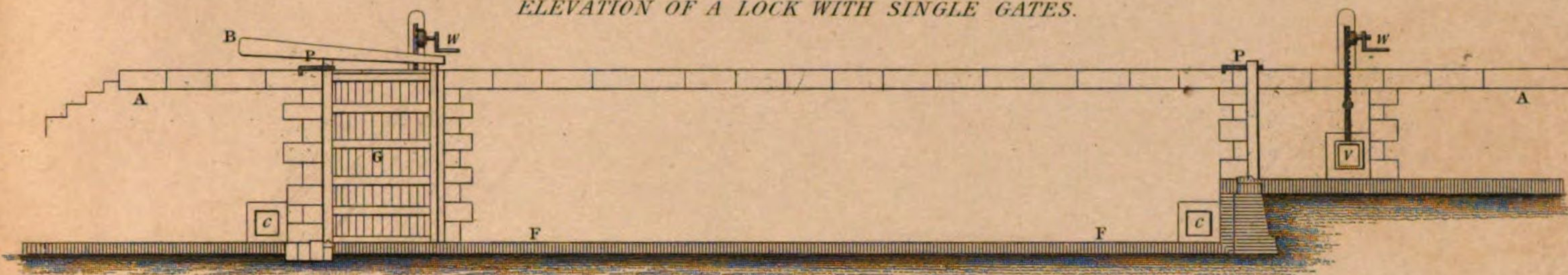


Fig. 2.

PLAN OF LOCK WITH SINGLE GATES.

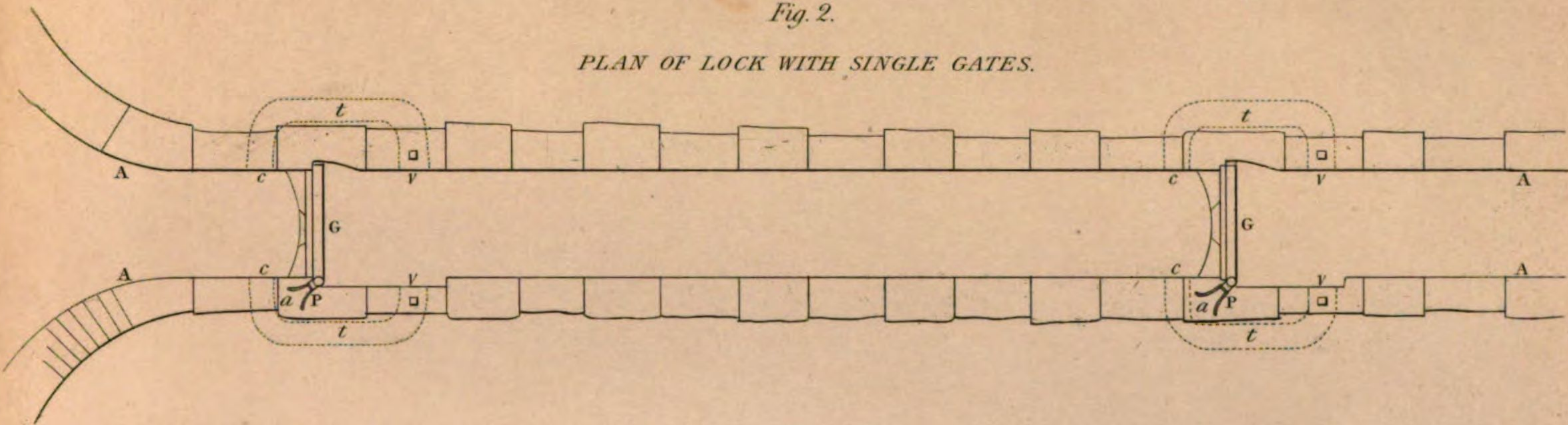


Fig. 3.

PLAN OF A TIDE LOCK.

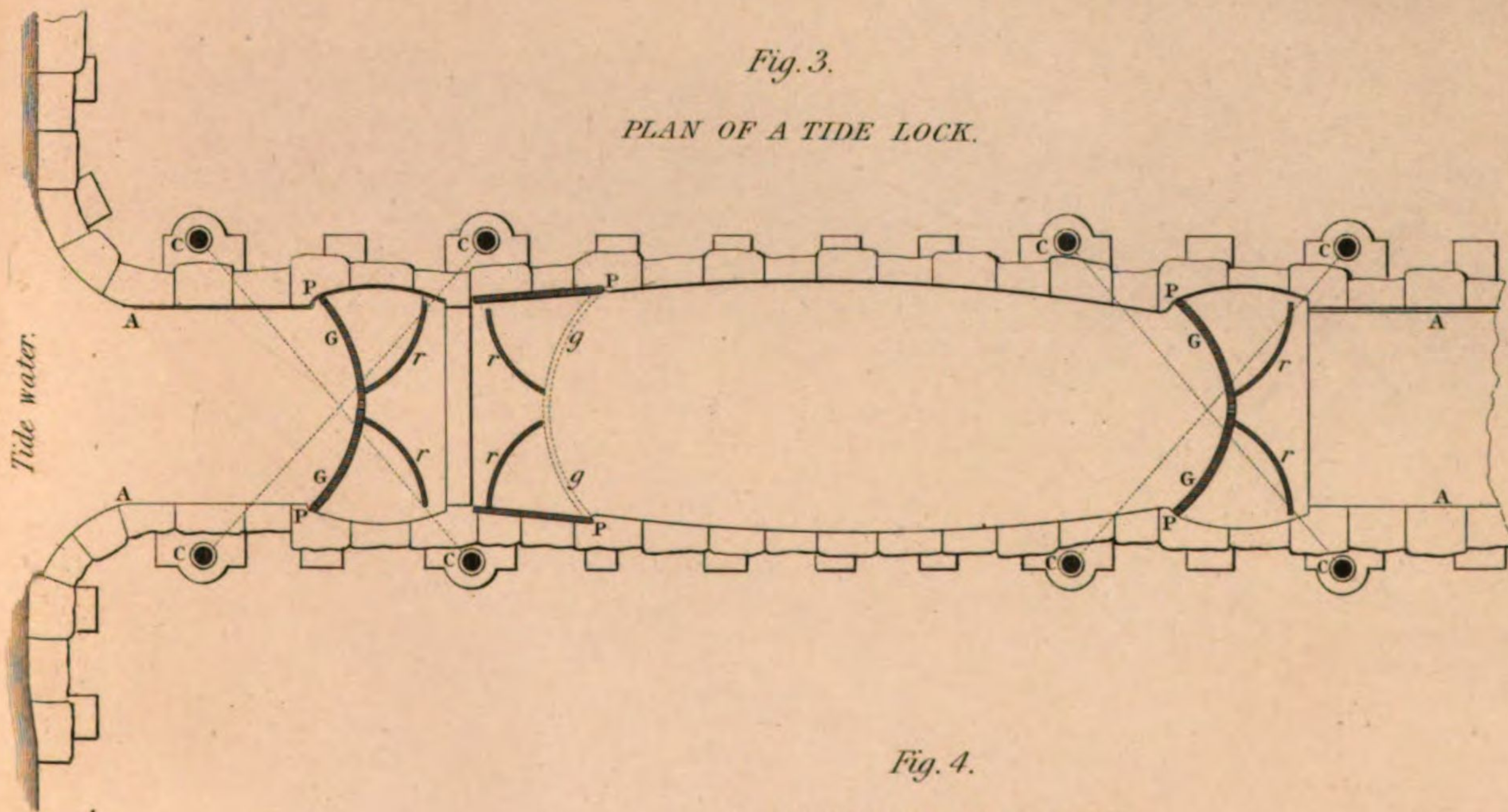


Fig. 5.

SECTION.

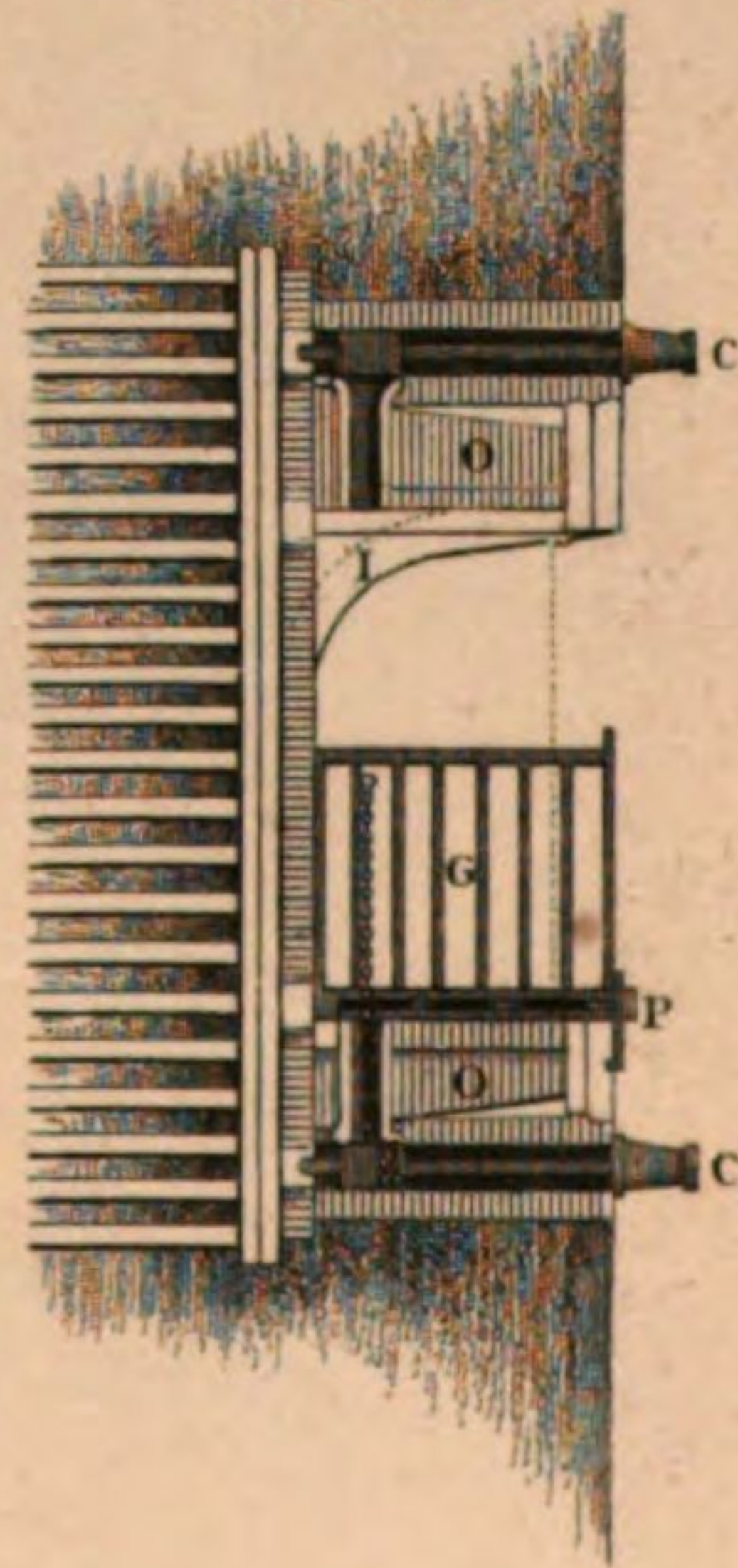
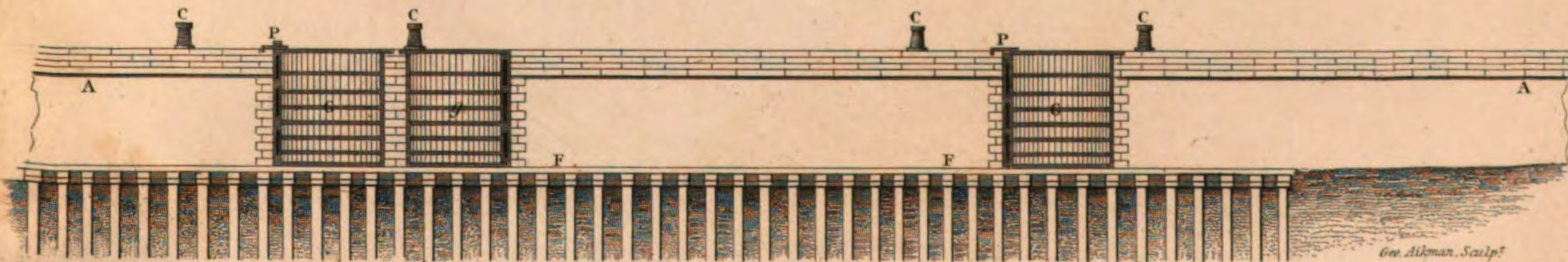


Fig. 4.

ELEVATION OF TIDE LOCK.



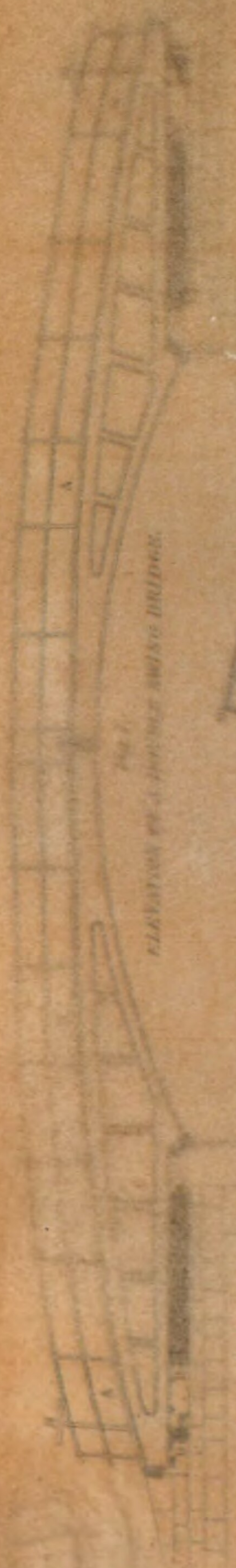


Fig. 1. ELEVATION OF A BRIDGE BRIDGE



Fig. 2. ELEVATION OF A BRIDGE BRIDGE

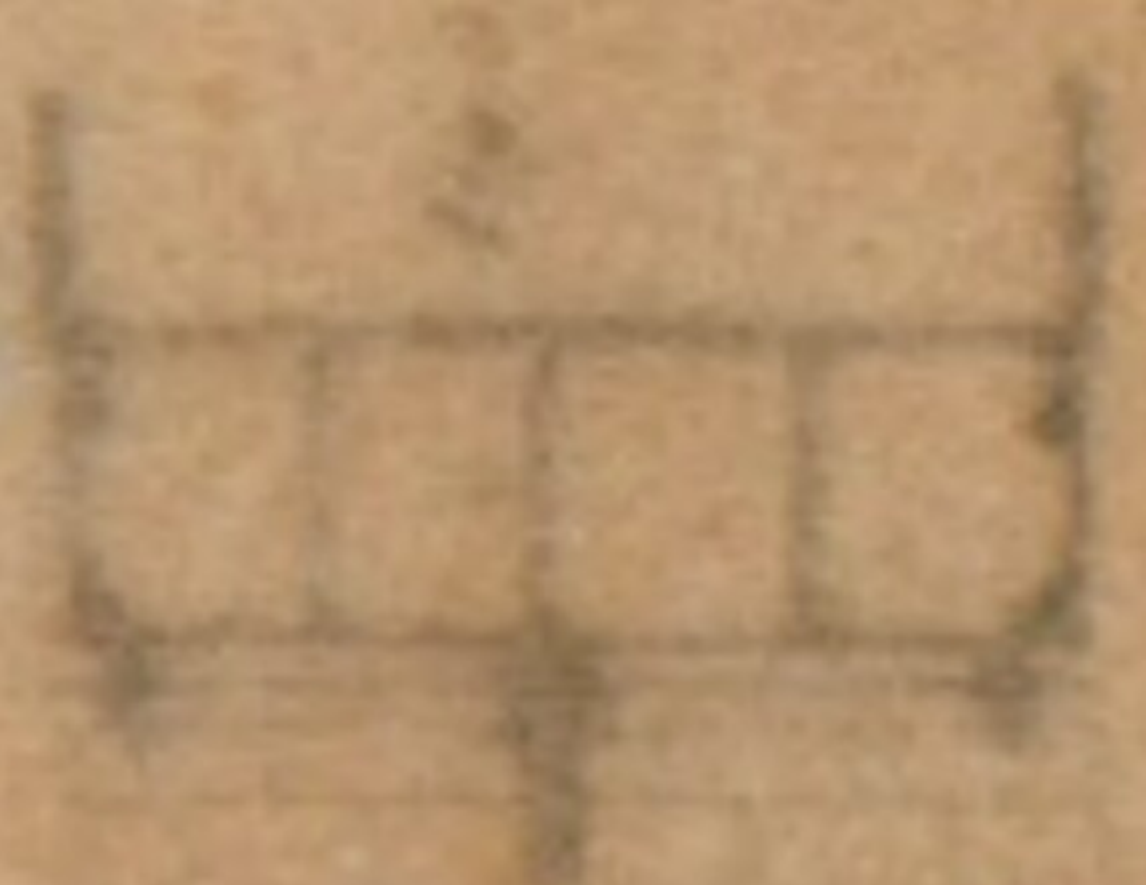
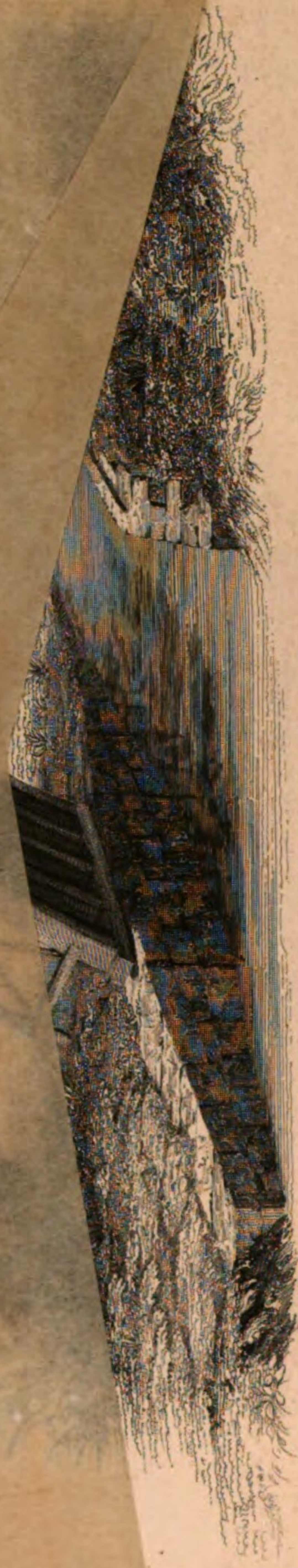
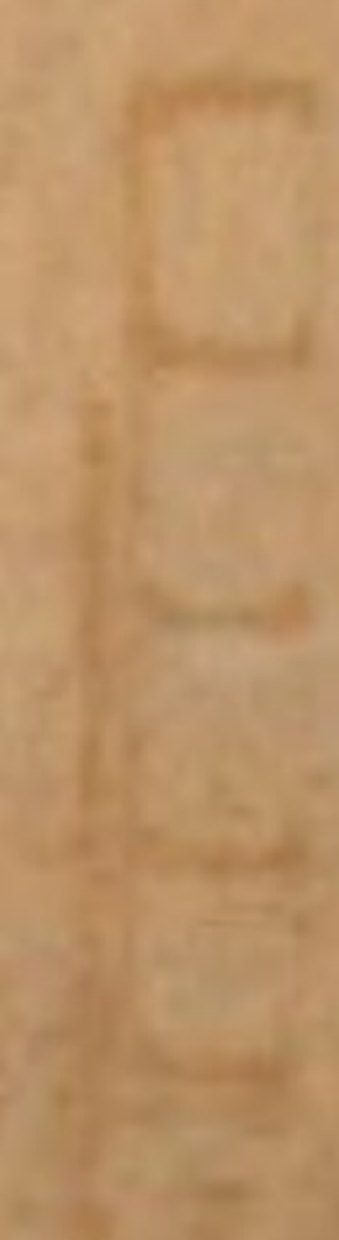


Fig. 4.



Fig. 5.





SECTION OF THE BUILDING

SECTION OF THE BUILDING



Fig. 1.
ELEVATION OF A DOUBLE SWING BRIDGE.



Fig. 3.

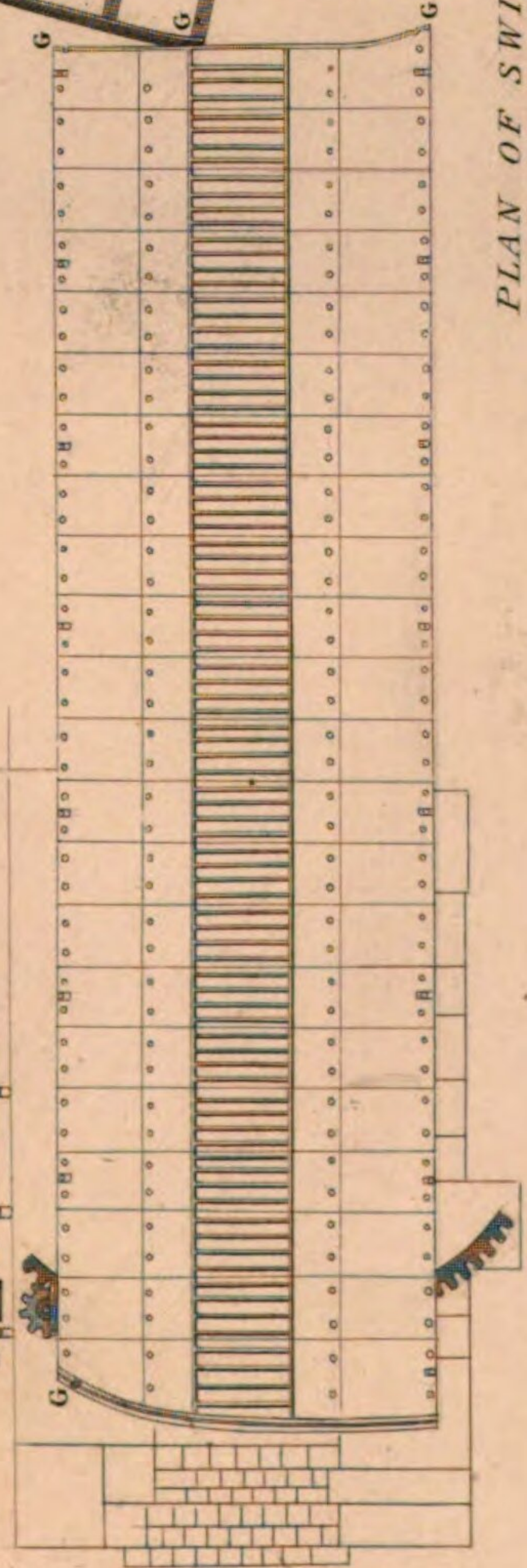


Fig. 2.

PLAN OF SWING BRIDGE.

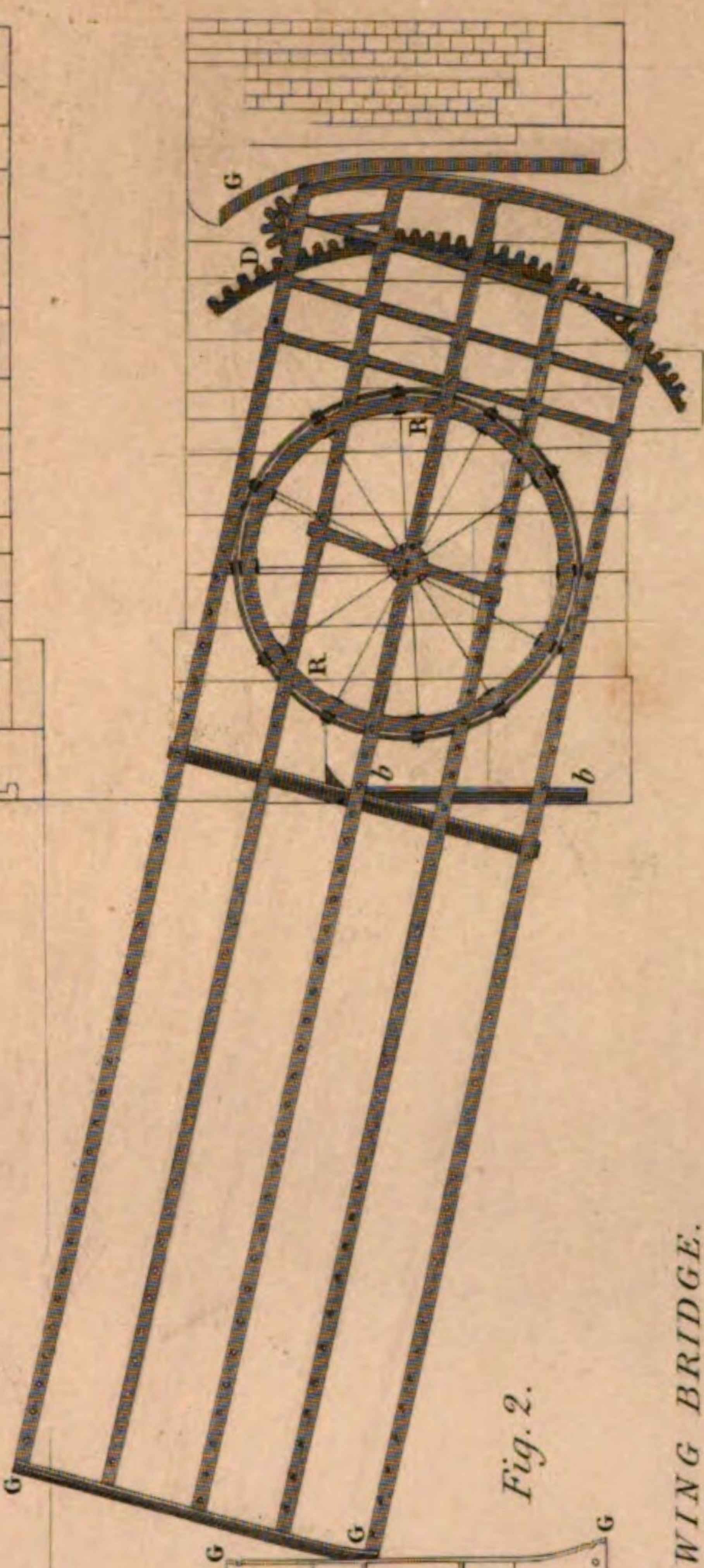


Fig. 6.

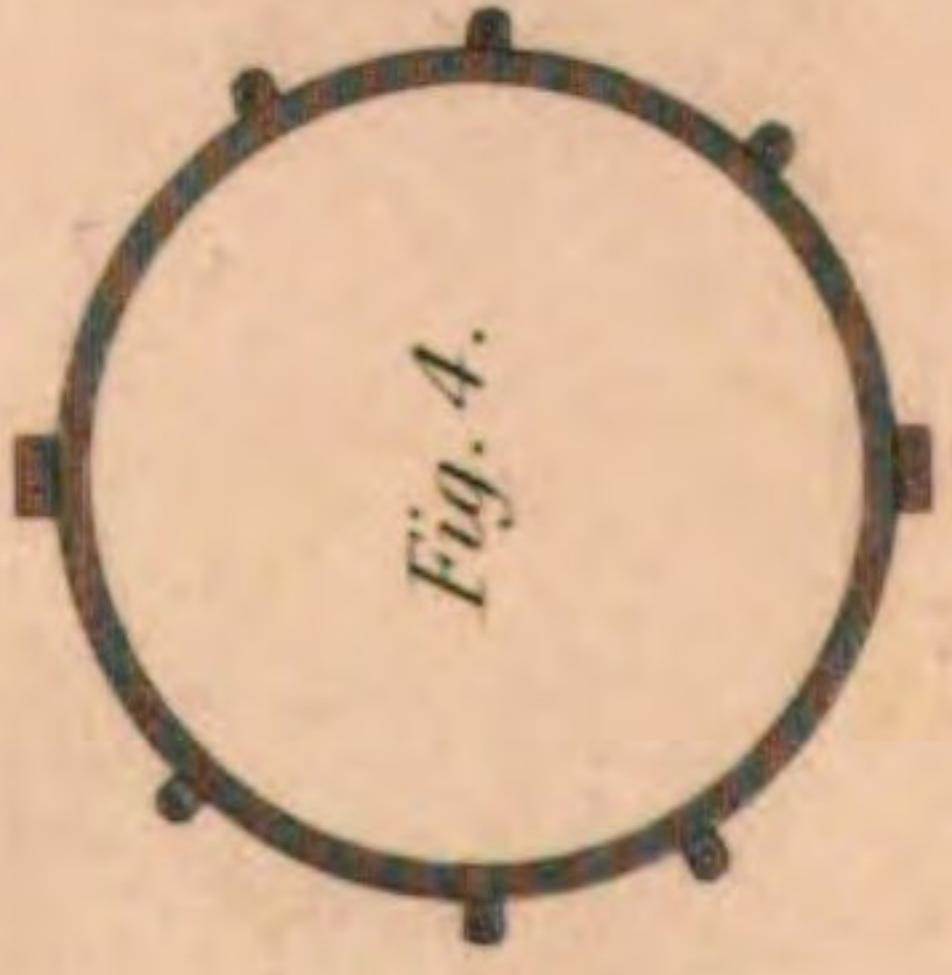


Fig. 4.

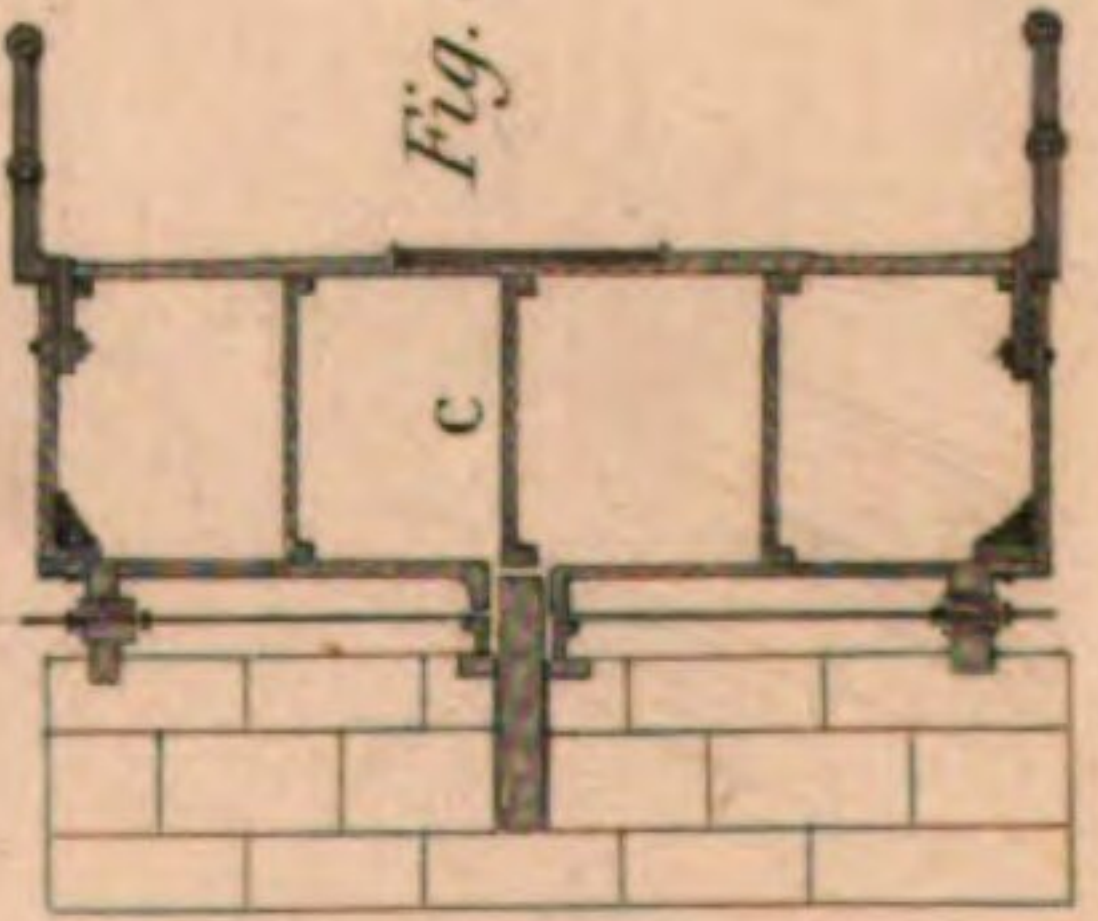


Fig. 5.

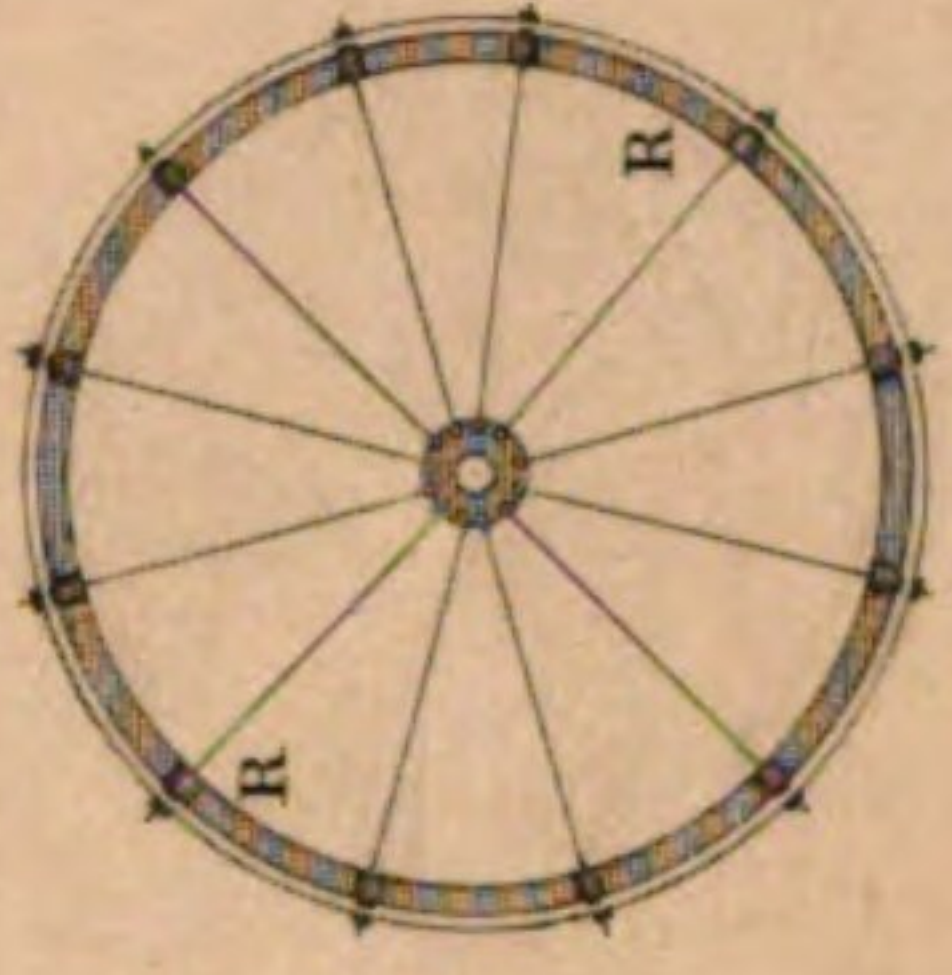
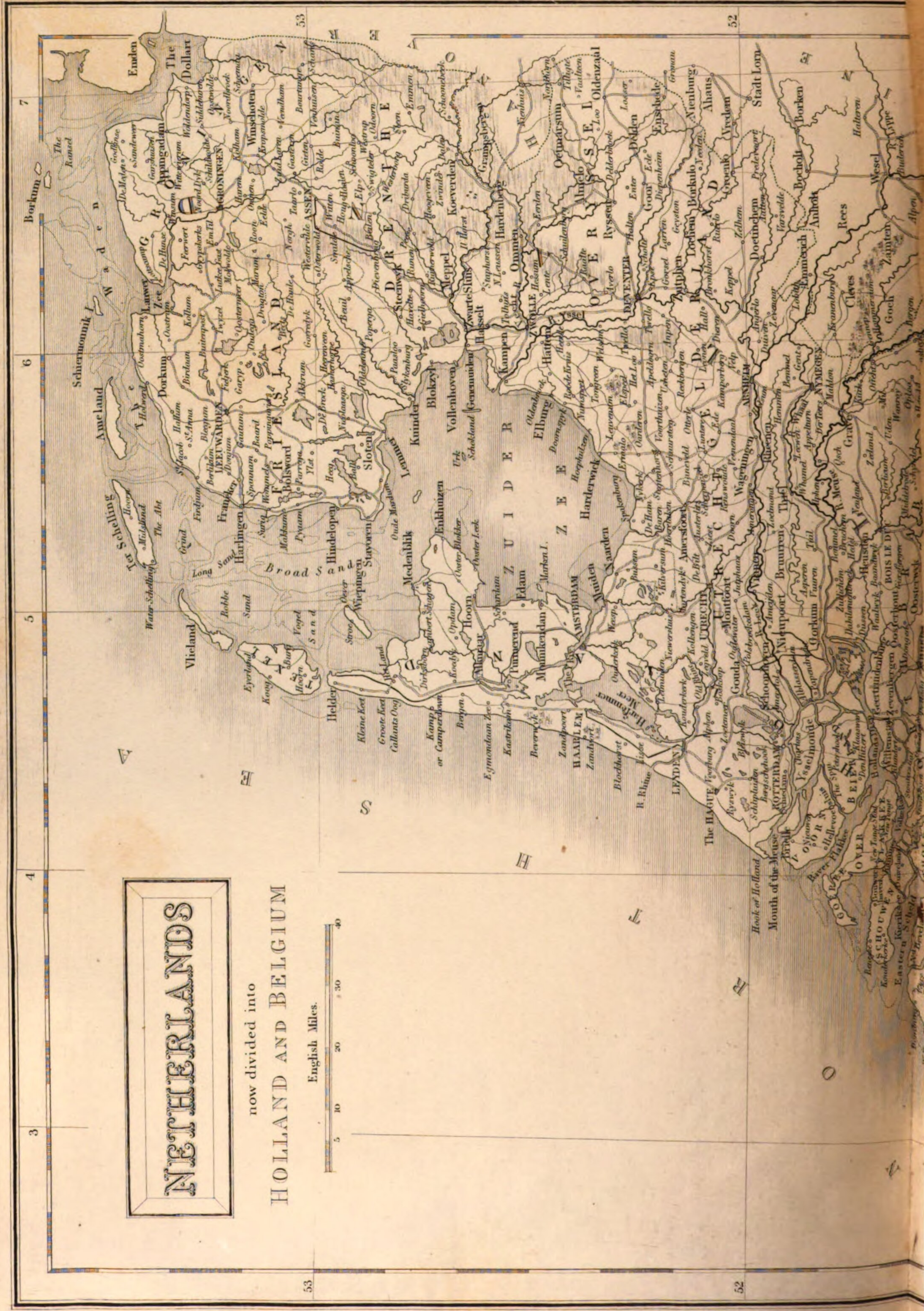


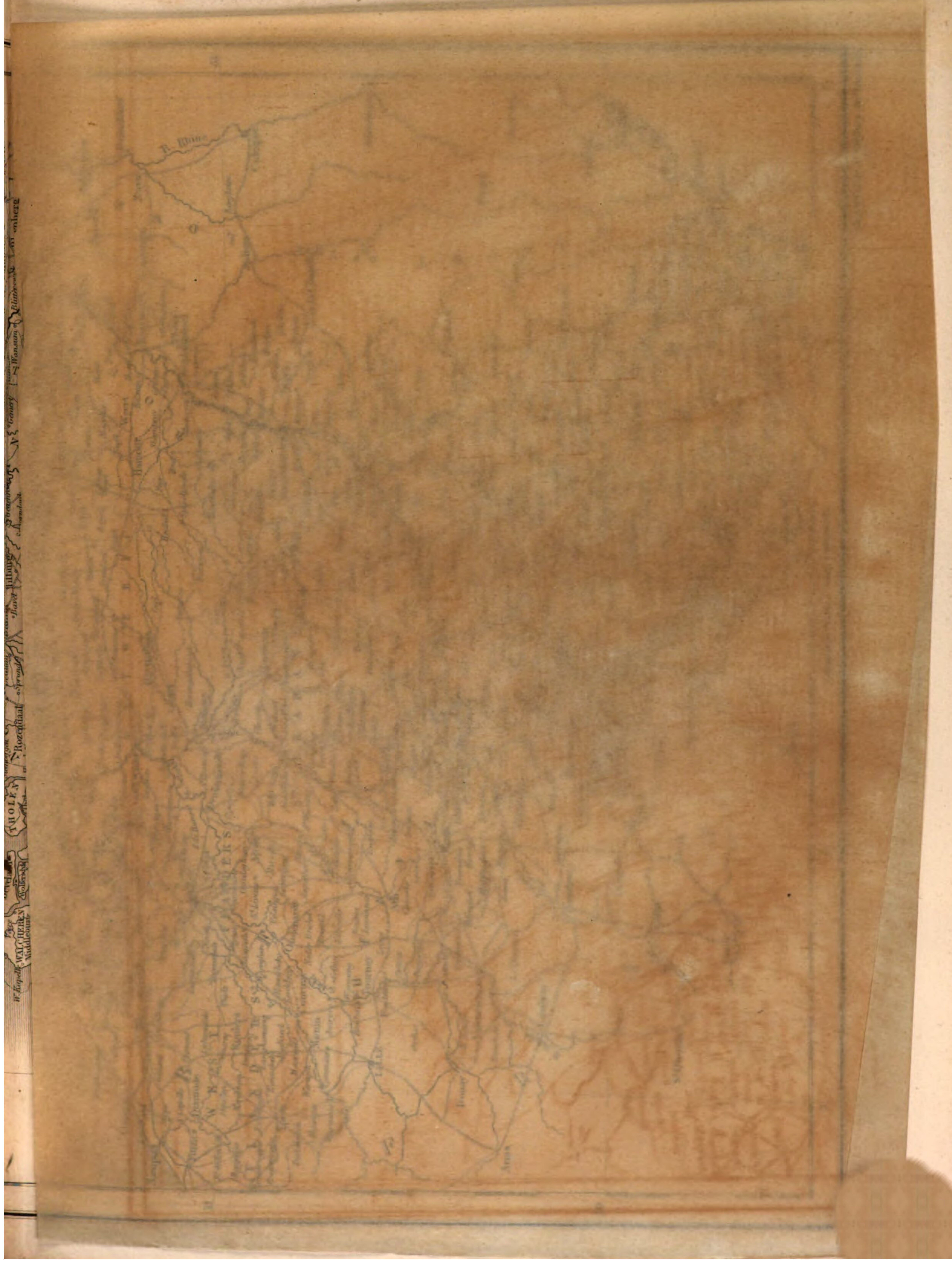
Fig. 7.

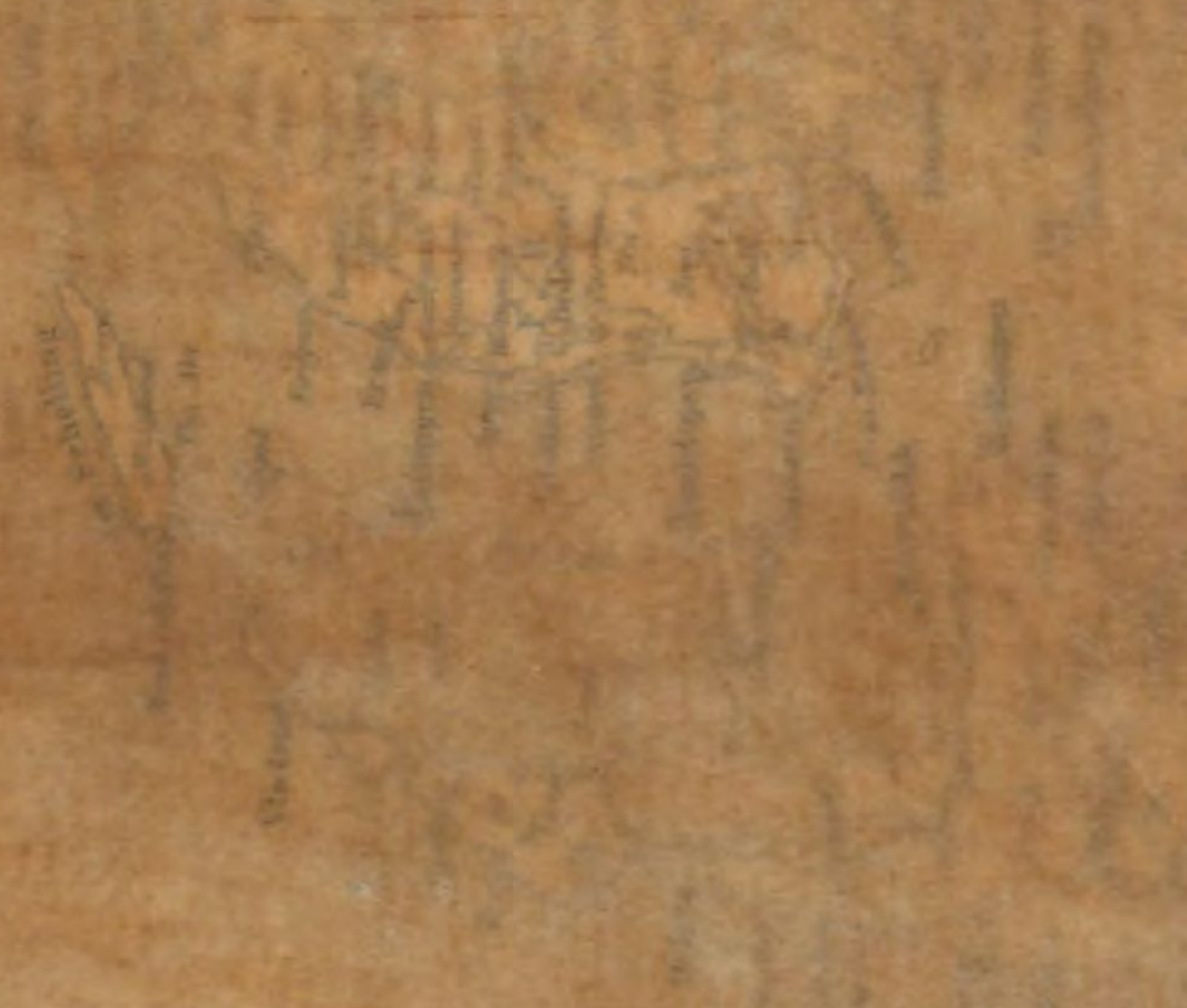
Fig. 8.

DRAW BRIDGE.

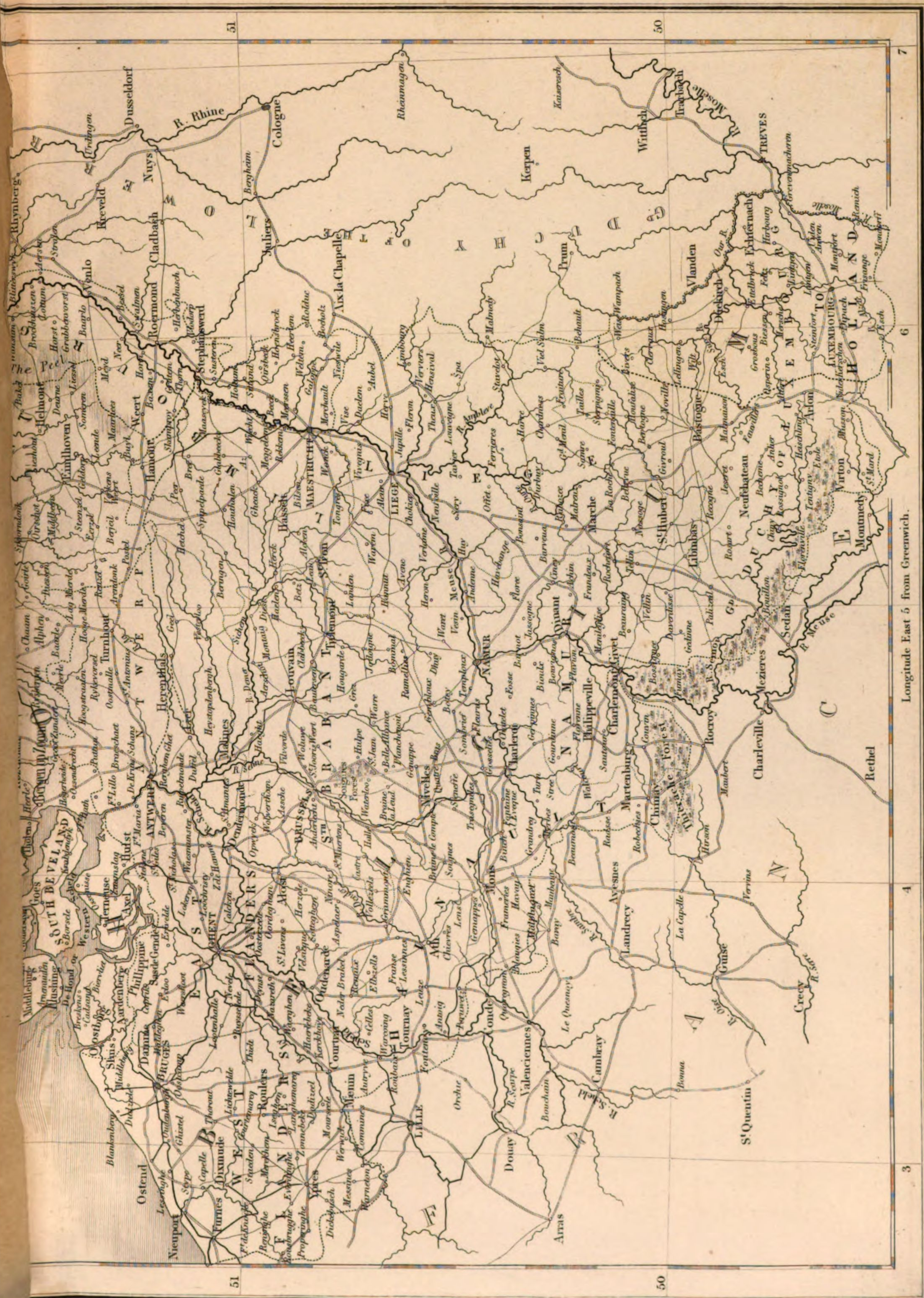




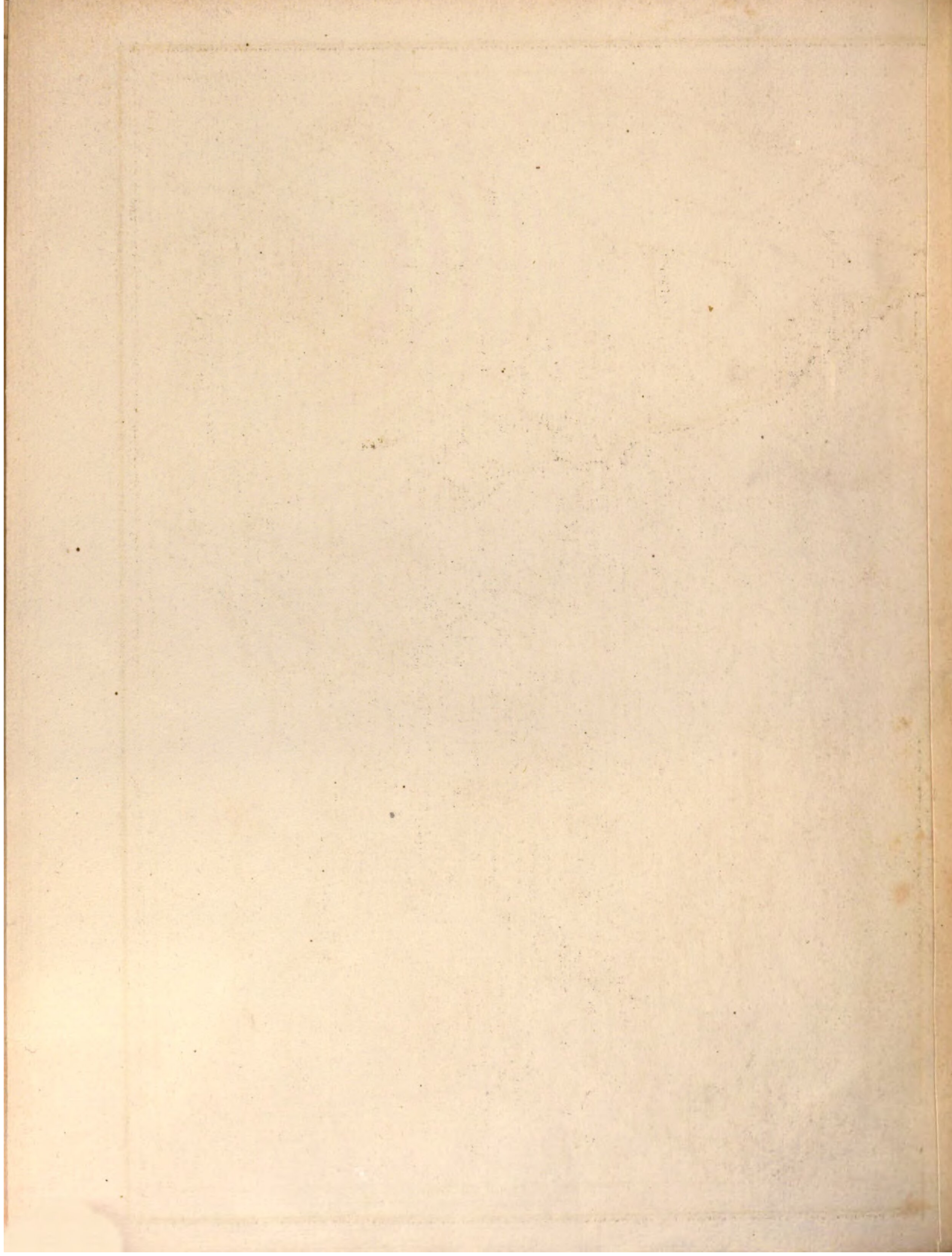




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